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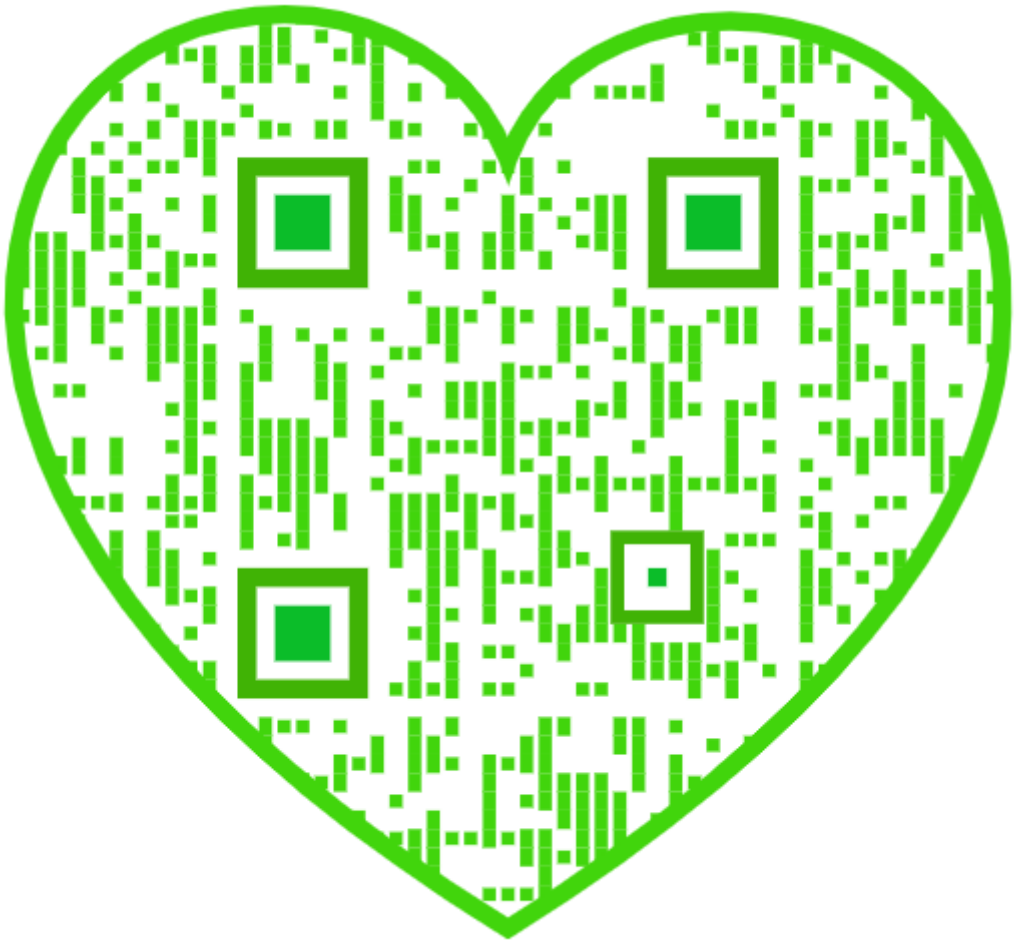

Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. X.—No. 1. (NEW SERIES.)

NEW YORK, JANUARY 2, 1864.

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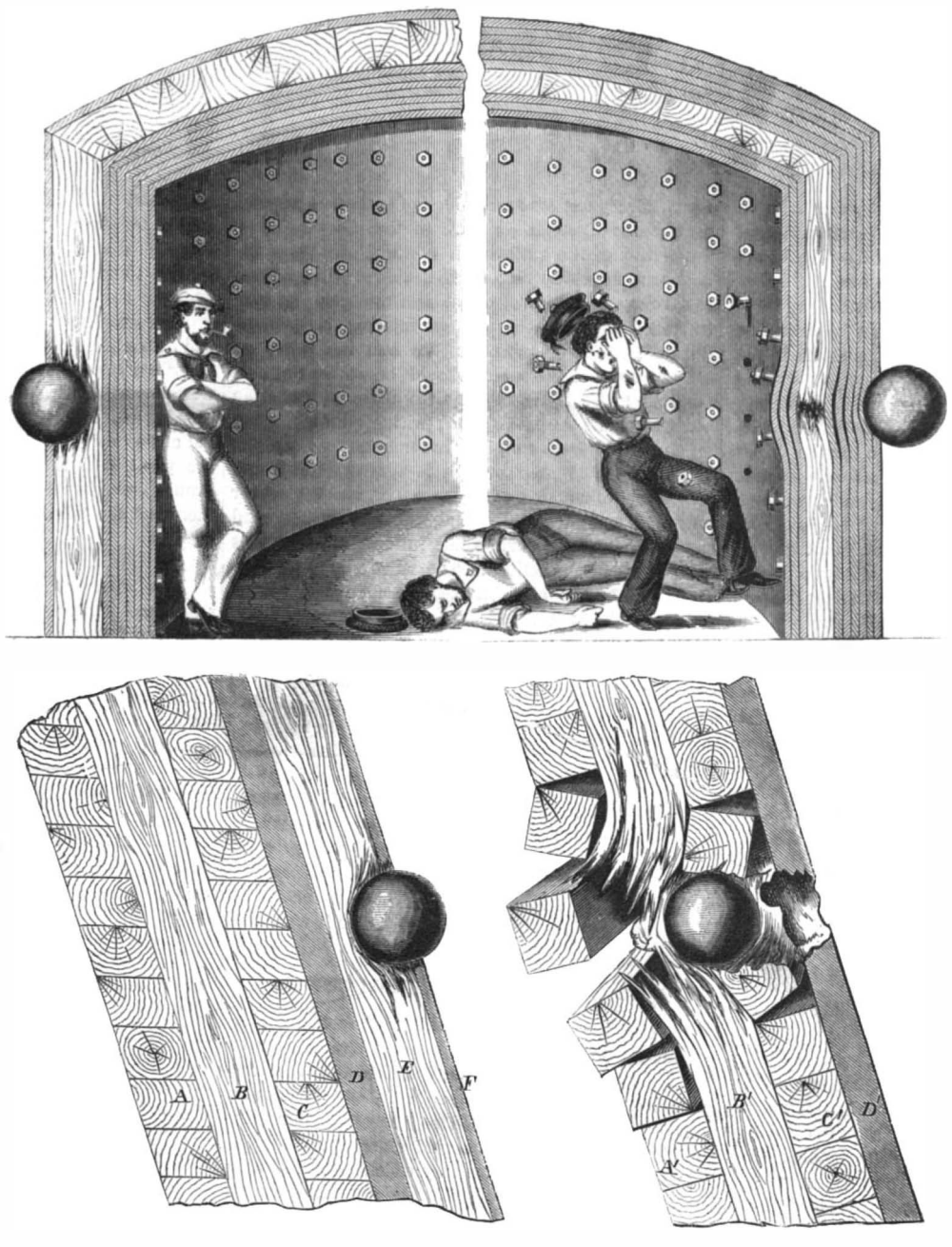
Improved System For Armored Ships.

The general struggle for naval supremacy which the first powers of the world are now engaged in, renders it important that, in the department of armored ships, no means should be left untried, or any methods unadopted, to secure complete invulnerability, for without this quality, sea-worthiness and speed are rendered wholly useless for war purposes. Up to this time the experiments of foreign powers prove that some reform is necessary in the construction of iron-clad sea-going vessels. So great is the load of armor, and so much does it strain the ships provided with it, that they cannot remain at sea during ordinarily heavy weather, even when unencumbered with their batteries. Such ships are useless as cruisers and for most other purposes, such as harbor defense and coast service, they are but poorly adapted. The problem submitted to naval constructors, ship builders, and also inventors, is to produce a fast sea-going ship completely shot-proof. As it has been previously shown that heavily-armored vessels cannot fulfill these conditions, we must look to some other plan, obviously, to reduce the weight of metal without impairing the general resisting powers of the protective coat.

The engravings published herewith represent a new plan of constructing armor for ships-of-war patented by Mr. C. W. S. Heaton, of Illinois; it consists simply in overlaying the iron armor with a timber or other yielding facing, as in Figs. 1, 2, and 3. This plan has been adopted after much experiment, the results thereof being highly satisfactory to the inventor and to Mr. W. H. Webb, of this city, in whose behalf the investigations were conducted. The inventor's theory is that the exterior yielding coating offers a gradual resistance to the blow of the shot, and that the penetrative force of the same is thereby greatly lessened by being distributed over a larger surface of iron. The targets on which the inventor experimented were made on his plan, and also on the system generally in vogue, viz., having the plates directly opposed to the wood backing, without any facing whatever. The effect of the shot, on Heaton's plan, is shown in Figs. 1 and 2—the engravings to be noticed in the order of their position—and the endurance of the ordinary mode of plating as well; the inventor stating that under exactly equal circumstances of range, weight of projectile charge of powder and gun, the ordinary target, also shown in connection with Heaton's, was penetrated and disabled. Some experiments were also tried at the Washington Navy Yard to prove the truth of this theory, where, it is asserted by the inventor, results similar to those just recorded took place; his system resisted the passage of the shot while the target without a wood facing was penetrated. It is also stated to us that Mr. W. H. Webb, of this city, and Capt. James Eads, of St. Louis—the latter well known as a constructor of iron-clads—fully endorse the inventor's plans and theory, after witnessing practical tests, and believe them to be all that he claims.



HEATON'S SYSTEM FOR ARMORED SHIP'S.

In Fig. 2 a thin iron plate, F, is shown, covering the wooden facing; this is merely applied to prevent a raking shot from scattering or disfiguring the timber, and is not intended to stop shot in any respect; the other view in the same figure represents the usual method of applying armor to ships-of-war. The several letters, A B C D E F, in Fig. 2, represent wooden backing, the armor proper, and external skin, while similar letters, in Fig. 2, A′ B′ C′ D′, represent the wooden backing and armor.

In the first engraving, representing a turret cut through the center and showing two distinct systems of plating, our artist has given a graphic illustration of the effects of a shot striking the turret wall with its full force, and of a similar shot striking upon the exterior of a turret plated according to Heaton's plan. In the latter turret it will be seen by the coolness of the sailor leaning against the wall, and wholly undisturbed from the absorbing occupation of smoking, that a fifteen-inch shot is unable to exert any material or injurious effect, while in the case of the two other unfortunates in the ordinary turret, the disastrous results of the impact of heavy shot is shown in the stunned and scarred forms of the inmates. In this illustration, as in the others previously alluded to, the idea to be conveyed is, that the outer elastic coating, whether of timber or any other substance, distributes the force of the projectile over a large area, and consequently diminishes its effect.

The effect of percussion upon an iron plate is tremendous, and may be illustrated, familiarly, by placing a heavy sledge-hammer on a thick iron plate and striking directly opposite it with a light hand hammer; the strength of a powerful man is not sufficient to keep the sledge in contact with the plate even when the same is struck by a youth. If these results are obtained with such feeble agents, what must be the shock of a heavy projectile striking a turret at the velocity of 1000 feet per second? Should the ends of the inventor be fully attained, and it is claimed that the experiments made are convincing upon this point, the value of his improvement is incalculable.

Fig. 3 is an illustration of the disruptive effects of percussion shells, on the ordinary plating, and upon Heaton's system.

The inventor claims that he is enabled, by his theory of gradual resistance and plan of construction, to dispense with a great deal of plating now carried, by

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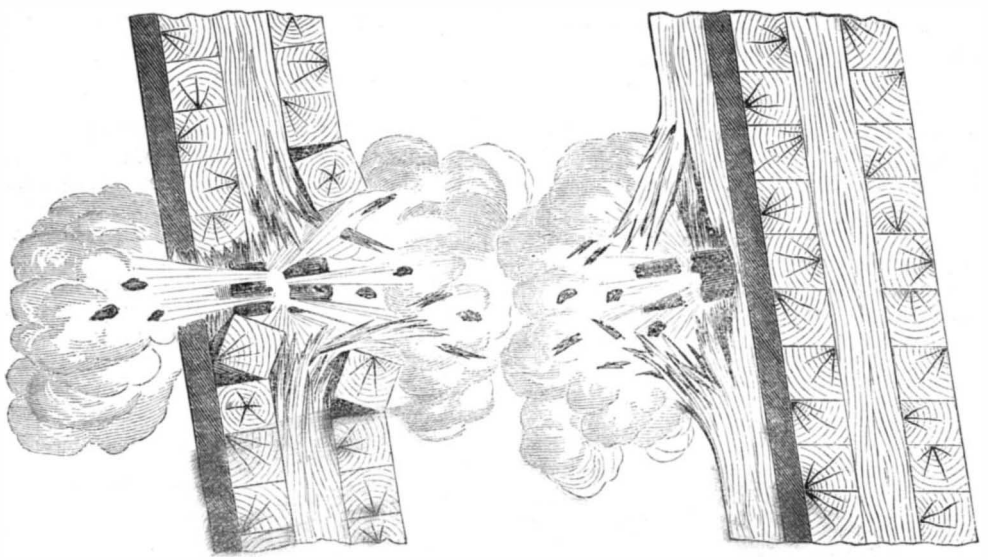
simply reducing its thickness and employing a covering of timber, cotton, woven wire-rope, yarn, or hemp in any form, rubber, wool, hair, or any other article which will produce the required effect; only in front of, instead of, as heretofore, behind the metal armor, as shown, and that vessels, in consequence, are much more sea-worthy, and are, in short, greatly improved. One iron-clad battery, at Greenpoint, the *Onondagua*, has been covered with this timber-facing outside of her regular mail, of four and a half inches solid plates, in exact accordance with the Heaton plan.

This invention was patented on the 14th April, 1863. Further information can be had by addressing the inventor, C. W. S. Heaton, at No. 200 Lewis street, New York, or W. H. Webb, New York city.

THE SLIDE VALVE.

This most essential detail of a steam engine is very often badly constructed, set and run. The valve may be called the heart of the machine, and any derangement in its functions results in loss of money, power, and reputation of the builders and all concerned in running or erecting steam machinery. In many places we have noticed a disregard of the commonest principles connected with the designing of slide valves, and deem it our duty to point out some frequent errors, so that they may be detected and rectified.



When the lead on the steam side of the valve is open, the exhaust side is closed and the steam behind the piston cannot escape until the valve has traveled far enough to open the exhaust port, which is a greater or less distance according to circumstances. This is one and a very serious defect; a piston is not meant for a punch, and steam is of so subtle a nature that, give it but the slightest opening and it will rush through like lightning. To remedy the evil just mentioned, take the steam chest entirely off the cylinder, if possible, take up the valve, and with a square and a scriber mark off the width of the faces which cover the ports on the outside of the valve; pursue the same course with the ports on the cylinder; then replace the valve, make the connection with the valve stem, and turn the crank on the center; the relative situations of the steam and exhaust ports will then be apparent at a glance if the eccentric is properly set. The distance or amount of opening which is proper on the exhaust side of a slide valve varies with the effect desired to be produced, and also with the ideas of different engineers; some claiming that a small amount of lead should be given to the exhaust, so that a portion of steam will be retained in the cylinder for the piston to cushion against; thus producing an elastic vapor which reacts to advantage when the cranks are passing the center.

This is not entirely our view of the subject, nor do we wholly believe in it; a little reflection we think will show that cushioning is of doubtful advantage; as a measure of economy it is useless. In the extreme compression which occurs at the end of the stroke, the crank is in fact one arm of a toggle joint—one of the strongest mechanical agents known through which to exert force—and steam even of a high tension would be, or could be, raised still higher in temperature by the compression to which it is subjected, but even then it would exert a bad effect upon the live steam entering from the boiler. Of course we do not here condemn such cushioning as is absolutely necessary to safety; in locomotive or high speed screw engines, for instance, a certain amount of compression at the end of the stroke is essential to the safety of the machinery. The theory of compression is, however, a dangerous one, especially to novices in engineering, who are liable to overstep the bounds of science and cause loss where they intended gain. There is much more benefit to be derived from a clear field for the piston, or from the partial vacuum which is obtained through large exhaust possesses and properly set valves, than in all the fine-spun theories about cushioning, filling the passages with steam, &c.

In designing the outward form of slide valves there is a great deal of carelessness exhibited respecting the amount of surface exposed to the action of steam. Fillets are made unusually large, flanges extended unnecessarily, and extraordinary lap introduced, until the aggregate value of all the useless surface amounts to an addition of many hundred pounds pressure on the valve, when the steam worked is of a high pressure. Every useless square inch of surface represents the amount of steam pressure in the chest added to the friction of the surfaces in contact, and these details are so great in large valves that it is important to save every sixteenth of an inch that can be subtracted from the valve, without injuring its proportions. The line of contact of the seat and valve, or the two faces of the same, should be as accurate as possible, and this detail requires close attention in order to make the valve work with economy. After an engine has been running for some time the seat acquires a glazed surface, which is very difficult if not impossible to cut with a file or scraper, and the proper way is to make the valve and seat true at first, and not trust to its wearing fair in time, although this method is often practiced. The valve should be surfaced true by the aid of a metallic face plate, where it is possible, and the seat should then be scraped from the valve. When the valve is put into the chest, the faces of both it and the seat should be carefully cleaned with a pocket-handkerchief, so that no grit or dust, even, can possibly remain upon either; as the smallest particle will in a short time ruin the faces by working seams or ruts through which the steam leaks. The balancing of slide valves should also be attended to; a portion, at least, of the pressure might be taken off with advantage, and the mechanical effect would be much increased thereby. A well-proportioned slide valve is a most excellent device; it is one of the simplest and most effective valves, when well made, and much study might be given to it with advantage.

GOLD QUARTZ-MINING IN CALIFORNIA.

In currency gold is a medium of exchange; in commerce it is an article of barter, like copper or iron. Metals differ greatly in intrinsic value. Thus, an ounce and a half of gold is equal in value to about a tun of pig-iron. Being used so extensively for coin, and in the ornamental arts, gold always has been in great demand, and the country which yields it as a natural product, obtained at a moderate expense for labor, possesses great commercial advantages. The immense quantities of gold which have been shipped from America to Europe, have been like exports of copper, wheat and timber, exchanged for articles of clothing, cutlery, tea, coffee and sugar. Gold mining, like any other business, is profitable or unprofitable, according to the expense incurred in obtaining it. No metal is more universally distributed than gold. It is found in the sand of most rivers, and in nearly all alluvial deposits, and from these it can be separated by refined mechanical and chemical operations; but after all there are comparatively few sections of the globe where it can be profitably collected. America is one of the few countries which possesses extensive rich gold fields—that is, localities where the metal is thickly distributed among alluvial deposits, or confined in comparatively large quantities in veins of quartz. Already immense amounts have been gathered from the "placers" of California; but the whole of the Rocky Mountain ranges, on the east as well as the west side, contain quartzose veins rich in metal, and these may be worked with profit for centuries to come. Not only California, but the Colorado Territory has become a gold-yielding country. We have obtainded some interesting information on this subject from Messrs. Davidson and Pomeroy, of Davenport, Iowa; the former having been an engineer and explorer in the Rocky Mountains for thirteen years, and who is now in the Colorado Territory. We learn from a communication sent us, that the quartz of Colorado is different in some features from that of California. It is very rich in the precious metal, but it contains much sulphuret of iron, which prevents the mercury acting upon all the gold in the crushed quartz. It is calculated that only about twenty per cent of the gold is obtained by amalgamation, and that there is a loss of about 80 per cent. in the tailings. Yet, although there is such a loss of gold, the Colorado quartz is so rich in the metal that mining seems to prosper amazingly. We learn that about $20,000,000 will be the yield of the mines this year; which is extraordinary, considering the short period since they were opened. So important has the Colorado Territory become that a United States Mint has been erected at Denver City. A line of telegraph passes through the place, and there is a line of stages constantly running, making the trip in about six days between there and the railroad terminus on the Missouri river.

MISCELLANEOUS SUMMARY.

How Change of Sex is Accomplished in a Beehive.—Carpenter informs us that in every hive of bees the majority of individuals are neuters, which have the organs of the female sex undeveloped, and are incapable of reproduction, that function being restricted to the queen, who is the only perfect female in the community. If by any accident the queen is destroyed, or if she be purposely removed for the sake of experiment, the bees choose two or three from among the neuter eggs that have been deposited in their appropriate cells, which they have the power of converting into queens. The first operation is to change the cells in which they lie into royal cells; which differ from the others in form, and are of much larger dimensions; and when the eggs are hatched, the maggot is supplied with food of a very different nature from the farina or bee bread which has been stored up for the nourishment of the workers, being of a jelly-like consistence and pungent stimulating character. After the usual transformation, the grub becomes a perfect queen, differing from the neuter bee, into which it would otherwise have changed, not only in the development of the reproductive system, but in the general form of the body, the proportionate length of wings, the shape of the tongue, jaw and sting, the absence of the hollow in the thighs where pollen is carried, and the loss of power of secreting wax.

Royal Good Sense..—The Rev. J. C. Fletch[illegible] describing his entertainment by that model Emp[illegible] of Brazil, Don Pedro II., writes: "The Emp[illegible] is amiability itself, while the princesses are re[illegible] such an education—practical and accomplish[illegible] as would make all sensible parents in the United States rejoice, and desire that their daughters, too, might be so wisely trained. In reference to practica[illegible] may mention that each of the princesses pos[illegible] a beautiful sewing machine of the Wheeler & Wilson

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patent, and busy needle-music is heard in the palace each day at the appointed hour for such recreation."

ARSENIC AS A PREVENTIVE OF DISEASE.—M. Monigny, French Consul in China, in reference to the use of arsenic by the Northern Chinese, says they mingle it with their smoking tobacco. According to missionaries who have lived a long time there, tobacco free from arsenic is not sold. The same witnesses assured the consul that the arsenic smokers were stout fellows, with "lungs like a blacksmith's bellows, and as rosy as cherubs." The publication of M. Montigny's statement has called out a letter from Dr. Londe, who announces that some years ago, in the course of a discussion at the Academy of Medicine, on the agents to be employed to cure tubercular consumption, he told the assembled doctors that he had found but one successful means of combating this dreadful disease, and that means was the smoking of arsenic. The doctor re-affirms his commendation of this remedy.

SHODDY.—Many persons have heard of shoddy who do not know its nature and use. It is made from woolen rags, which are torn and cut up by machinery for the purpose of mixing the product with new wool, to be made into cloth and other woolen fabrics. Cloth made with a mixture of shoddy is inferior in strength to that made from fresh wool, because much of the old rags from which the shoddy is made is rotten, and has lost its original strength of fiber. Shoddy is employed very extensively in the manufacture of cheap woolen goods, which do not wear half so long as those which are somewhat higher in price, made of clean new wool.

SUCCESS OF DABOLL'S FOG SIGNAL ABROAD.—Daboll's fog trumpet, about which so much has been said, has at last, after persistent efforts by the inventor, been adopted by the English Government. Recent experiments made in England prove that this fog trumpet can be heard further than any others in that country. Steps are being taken to make an immense machine of this description, to be placed on Cape Race, where so many accidents have repeatedly occurred. We are pleased to hear of Mr. Daboll's success; he has shown the right spirit on this subject and pushed his claims with great energy for many years.

PORT-HOLES IN THE MONITOR TURRETS. — The holes for the guns in the monitor turrets are by some shops cut out of the solid metal; when the turret is completed, a boring head, provided with cutters like lathe tools is set on a shaft in a frame made for it, and brought into contact with the turret wall: when power is communicated to the boring head by a small engine the cutters soon make a large hole 15 inches in diameter. The plates are cut out; the iron is not removed bodily but in disks. Other shops punch the hole in each sheet before the turret is set up and then dress the aperture out neatly after all the plates are erected.

GEMS OF COLORADO.—Among the rocks in that territory are found beautiful translucent quartz crystals, tinged with crimson and purple, and often classed as amethysts, amazon stones, beryls, opals in varieties, garnets and turquoise. On the plains are found the most beautiful and curious of agates, birdseye, catseye, moss and fortification. Sardonyx, jasper and malachite also abound. Here, too, are obtained fossils in great abundance. We understand that these precious stones are beginning to be kept for sale at all the jewelers' shops in the territory, and we wonder they have not yet found their way to New York.

A LARGE fly-wheel weighing 60 tuns was recently constructed in England and put together in several parts; the rim was in four sections and the light arms and center were also cast separately; when finally adjusted it ran only one-fourth of an inch out of truth.

SOME of the English peasantry took the recent earthquake for a sign that the world was coming to an end, and packed up to emigrate to America, to avoid the calamity.

A BALE of cotton recently received by Wm. Pollock, of South Adams, contained a stick of yellow pine weighing 186 pounds, which at 90 cents per pound cost $168 40.

THE steamer *Daniel Drew* has been cut in two, and will have fifty feet added to its length: this is one of the fastest boats that ever ran on the North river.

POWDER OF MILK.—The powder of milk, added to water, forms an agreeable drink, and an excellent substitute for milk:—Milk, two pints; water, one ounce; sugar, one pound. This mixture is then to be gently heated and constantly stirred. When it is three-fourths evaporated, the sugar is to be gradually added and the whole briskly stirred. After it is perfectly incorporated, the mixture is to be removed from the fire, poured into plates, and dried in an oven. When perfectly dry it is to be finely powdered and kept in well-stopped bottles. One or two teaspoonfuls is sufficient for a cup of tea or coffee.

INDIAN MUSLIN.—It appears that the manufactures in Bengal were formerly incomparably finer than they are at present; there was a sort of muslin called Abrooan, which was manufactured solely for the use of the emperor's seraglio, a piece of which costing 400 rupees or $250, if spread upon wet grass, would have been scarcely visible. In the Nabob Alaverdy Khawn's time, a weaver was chastised and turned out of the city of Dacca, for his neglect, in not preventing his cow from eating up a piece of the same sort of muslin, which he had spread, and carelessly left on the grass.

BORING LARGE CRANKS.—In our large machine shops the shaft holes in heavy cranks are cut out of the solid metal by long-legged cutters set in a cast-iron head. These tools remove a central core from ten to fifteen inches in diameter. One side is run down first, the crank is then reversed, and the second cut started from the opposite side; when both cuts meet the core drops out, and the hole only needs a little trimming to be completed.

IT is interesting to note that the school books lately published by the Austrian Government are printed on paper made of "corn shucks," or the leaves which protect the ear of maize. This material gives the page a yellowish color, which medical men hold to be less fatiguing to the eye than our snowy pages.

AN explosion of detonating powder took place recently at the American Cap and Flask Company's factory, Waterbury, Conn., by which the lower part of the building was shattered. A returned volunteer named Edward Rush seized a bucket full of the explosive mixture and carried it out at the risk of his life.

WE hope our readers will not omit to notice the proposals for a steam car issued by a Cincinnati railroad company; the advertisement can be found on page 15 of the present number of this paper: the adoption of steam on city railroads is a thing urgently needed, and we are glad to see sufficient enterprise manifested to give it a fair trial.

EXPERIMENTS are being made in France with a new kind of rocket, which is to prevent the enemy from working at night. Besides giving a most brilliant light, illuminating a distance of 200 meters when let off, it offers the additional advantage of finally bursting like a howitzer, and carrying wholesale destruction into the hostile camp.

A PATENT has just been taken out in England for perforating the leaves of books and pamphlets after the manner of postage-stamp sheets. If the invention can be applied, all those who read will rise up and call the inventor blessed, as the necessity of using paper cutters will be removed.

A SCIENTIFIC expedition, led by the eminent north-country naturalist, the Rev. H. B. Tristram, of Greatham, is on its way to Syria. The members will employ themselves several months in exploring the zoology, botany and geology of that interesting land.

WE are indebted to Hon. P. H. Watson, Assistant Secretary of War, for a copy of the Report of the Secretary of War and also of the Commander-in-Chief Gen. Halleck.

Shelter for Sheep.

There is no season of the year when sheep are more liable to lose nearly all they have gained than during the fall and early winter; and if they do, there is an end to the hopes of a crop of wool. For the want of food has the effect of stopping the growth of the wool, and the moment the growth is stopped, the end of the fiber is completed; a change takes place, it becomes dead, in a manner analogous to the stem of ripe fruit, and a renewal of good feed after these months, and after the growth of the wool has been once stopped, only prepares the skin to send forth a new growth that pushes off the old fleece, and causes it to be lost before shearing time. Nothing is more evident from this than that the economy of the wool-grower consists in keeping his sheep well fed during the early part of winter, and also well protected from storms; for it is plain from the fact that wool begins to grow, even on poorly kept sheep, as soon as the temperature of spring permits the animal economy to divert some of the supplies from being consumed in keeping up the vital organization, to the increase of the fleece, that heat has as much to do with the growth of wool as with the growth of plants. Hence we say give sheep protection at an early date.

NEW BOOKS AND PUBLICATIONS

THE NATIONAL BANNER. Published by Delphine H. Baker, 37 Park Row, New York.

This is a weekly journal, issued, as its prospectus says, for the purpose of creating a patriotic fund for the benefit of the sick, wounded and disabled soldiers and their families, by giving 50 per cent of all the subscriptions received for said paper to the maintenance and support of such fund. The enterprise is favorably looked upon by several members of Congress and other gentlemen, and the lady publisher has the support and good wishes of the most respectable portion of the community. The character of the paper is elevated, and the contents a miscellaneous compilation of the current items and topics of the day, interspersed with literature, religious matter, poetry, &c. The subscription price is $1 50 per annum, half of which goes to the "Soldiers' Fund," and the other half to the maintenance of the *Banner*. It is also in contemplation to sustain a course of lectures in connection with the same object—the collection of a fund—and several eminent clergymen and others are named as lecturers, one-half the proceeds of which are to be devoted to the fund. This is a good opportunity for our readers to show their patriotism. The first lecture was given on Saturday, Dec. 12, at the Cooper Institute.

THE ILLUSTRATED ANNUAL REGISTER OF RURAL AFFAIRS for 1864.

We always receive this interesting annual with great pleasure. Nothing is better adapted to entertain and instruct farmers and all who take interest in matters about the farm-yard. The "Register" has been issued for ten years from the office of the *Country Gentleman*, at Albany, N. Y., by the publishers, Luther Tucker & Son, price 25 cents. The number before us contains a calender adapted to the Northern States, also 130 excellent engravings, relating to the management of swine, road making, the dairy, fruit culture, the poultry yard, cheese making, and other subjects valuable to the farmer, gardener, and householder.

THE PHRENOLOGICAL JOURNAL.—This instructive periodical commences new volume with the new year. Those who desire to provide themselves with a most interesting and at the same time most intellectual fund of reading matter, should subscribe to this excellent periodical. The amount of engraved portraiture which appears in its columns is quite large, and of itself trebly worth the cost of subscription. Fowler & Wells, 308 Broadway, New York.

Forests a Necessity of Fertility.

The value of forests to a country in retaining moisture is well illustrated by the late severe freshets of the Connecticut valley. The snow melts quicker in an open country, and is retained longer among groves. Formerly the Connecticut River and its tributaries were clothed with forests; now they are largely denuded, and we have reason to expect greater freshets than formerly. The present barrenness of Greece and Palestine, as contrasted with their former fertility, is similarly accounted for. Dr. Unger, a celebrated naturalist of Vienna, claims that the climate lacks its original moisture. He says that the hordes of warriors that have followed each other for centuries on that soil have burned up the forests, and every effort of nature to make restoration is subdued by a superabundance of goats. The population live on the products of the goats, and the goats crop every twig, thus bringing barrenness. If the forests should ever again grow, Dr. Unger thinks that fertility would be restored.

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INVENTIVE PROGRESS—PAST AND FUTURE.

Before proceeding from one stage to another of a long journey, it is prudent to arrange the knowledge that has been acquired by past experience, that it may be applied profitably as a guide for the future. Thus, at the commencement of another New Year of the SCIENTIFIC AMERICAN, we may be benefitted by taking a rapid survey of the past and accepting its lessons. Like the granite pier which supports the lofty arch over which a nation's commerce may be carried, so the metal *iron* is the buttress and support which upholds the procession of the modern industrial arts. Without this metal, steam engines, steam ships, railways, mining and modern manufacturing machinery, would still have been unknown. Every improvement in the manufacture and application of iron—either cast, malleable, wrought, or as steel—is therefore of vast consequence. Cast-iron is a valuable material, because it may be melted and molded in any suitable form. In this state, however, it is very brittle; hence to obtain strong wrought iron, it has to undergo several expensive operations, and in this state it cannot be melted and cast. By the "malleabelizing" process castings are subjected for several days to a high heat in the presence of an oxide, being thus made more tough, while retaining their original form; but this is a tedious and troublesome operation. Our foreign exchanges chronicle the production of good malleable cast-iron in Glasgow, Scotland, by which castings are produced direct from the molten metal, and are nearly as strong as forgings of wrought-iron, and for many important purposes will supersede it.

Until recently no fine commercial cast-steel had been made in America, but now its manufacture is carried on with success in Pittsburgh, Pa., and at Rockaway, N. J. In many respects, however, we are still far behind European steel manufacturers, more especially in the production of large articles. Krupp, of Prussia, produces castings and forgings of steel in such masses that the efforts of our steel manufacturers, compared to his, are like the efforts of Lilliputians to Titans. Expensive apparatus, ponderous engines and mechanism, and large capital are necessary to conduct the applications of steel upon a large scale. But with patience and perseverance, American steel manufacturers and fabricators of articles in steel should advance to an equality with the first in the world. The production of steel from pig iron, by what is called the "Bessemer process," is rapidly extending in Europe. This metal is employed for making tires for locomotive wheels, and is coming into general use for rails. After careful experiments with iron and steel rails, it has been found that the latter are about five times more durable than the former, and several great railway companies in England have adopted them exclusively. Such rails will effect a great saving in the cost of maintaining railways, and we may expect to see them come into extensive use in America. One establishment in Troy, N. Y., is engaged in the manufacture of this metal for such purposes.

A great impetus has been given to the manufacture of thick American iron plates for war vessels, but too little attention has been bestowed upon the production of long and broad thin plates for merchant steamers. This is undoubtedly owing to the slow progress of mercantile iron ship-building among us. But as steel is far superior to iron for the thin plates, used in building merchant steamers, much attention should be devoted to this art. Two steel vessels were lately launched at Liverpool, one of 1,271 tuns, the other of 1,491 tuns burthen. As the relative strength of this metal in plate compared to iron is as 8 to 5, the weight of steel used in the vessel of 1,271 tuns was but 500 tuns, whereas, had it been built of iron it would have been 800 tuns. A great iron steamship, like the *Persia*, if built of steel instead of iron, could carry double her present cargo. For composite girders of bridges, boilers, &c., steel should take the place of iron, because greater strength can be secured with the same weight of metal.

The greatest feat of engineering in the form of tunneling ever attempted, is that of cutting seven miles through Mont Cenis, in which an ingenious mode of drilling has been adopted by the Italian engineers. They have applied the power of water from the snow-capped mountains to compress air, by the use of pumps; then conveying it, by flexible tubes, into the tunnel, to supply fresh air to the miners; and no vertical shafts are sunk. We suggest the employment of compressed air, in this manner, to operate excavating machines in our coal mines. All danger from fire, as compared with steam, would thus be obviated, and the mines ventilated at the same time.

Silk manufactures are on the increase among us. Silk fabrics are now made at Hartford, Conn., and at Cohoes, New York, and a manufactory has gone into successful operation in the Eastern District of Brooklyn. A large number of articles which were lately made in France, and imported, are now manufactured successfully in the vicinity of New York,

Less attention has been devoted to the cultivation of flax by our farmers than we anticipated. Owing to the scarcity of cotton and its high price, remunerative rates could have been obtained for very large large quantities of flax fiber, and for several years to come it may be cultivated as a profitable crop. In connection with this subject, we urge the cultivation of cotton in Delaware and Maryland, as it is a historical fact that American cotton was first successfully raised in these States.

Great progress has been made in railroad construction during the past year. Several hundred miles of the Atlantic and Great Western Railway have been completed, and the work is now going rapidly forward, which will connect New York with the Mississippi by a continuous broad-gage line. It is contemplated that it will yet be carried to California, when the Atlantic and Pacific Oceans will be linked together by a splendid trunk line, reaching across the entire continent.

The application of injectors to the boilers of locomotives has become common. Some progress has been made in applying steam to city railroads, but the advance is very limited, owing to the ignorant prejudice of various corporations against steam, as being more dangerous than horse power.

A new telegraph has been adopted for army operations. The current is magneto-electric, generated by turning a small crank. Neither battery nor acids are required; the apparatus is compact and convenient, and may be carried in a soldier's haversack.

It is gratifying to know that a new Atlantic cable is being manufactured in London, and that measures are now in progress for laying it next summer. So many improvements have been made in the construction of submarine cables within a few years, that hopes are now entertained of establishing an Atlantic telegraph line.

A remarkable development has taken place during the past year in the American petroleum trade. Over twenty-four millions of gallons have been exported in twelve months, and about an equal quantity has been retained for home use. To a moderate extent petroleum has been successfully applied for making gas in small apparatus; but for the supply of cities it is more expensive than coal. A number of experiments have also been made to apply it as fuel under steam boilers, the high price of anthracite having stimulated efforts to obtain a cheaper substitute; but until petroleum can be sold for about six cents per gallon, it will not be capable of competing with coal for fuel.

The manufacture of syrup from sorghum has become an established business in the West, and great improvements have been made in the apparatus for evaporating the juice of the plant.

Sewing and knitting machines, clothes-washers and wringers have become common in most households. There is still great room left for improvement in inventing and adapting several simple and inexpensive machines for domestic use, especially for farmers; so that many of the natural products of the farm, which are now sold in the raw state, may be manufactured into articles for sale, during weather that is too stormy for out-door labor. Flax cordage and cloth, and various woolen fabrics, might be manufactured profitably by many farmers, in the winter season. In Italy and Switzerland, silk and flax articles and watches are made by the families in the rural districts at seasons when they cannot labor in the fields. With convenient braiding, sewing, knitting, spinning, weaving and other machines, operated by hand power, or with a portable steam engine or water wheel driven by a running brook, adjacent to the cottage, a farmer could combine mechanical and manufacturing operations with agriculture. Such establishments, under what is known as "the factory system," have many objectionable features; hence domestic manufactures should always be encouraged. Plowing by steam power has become common in Europe, but it has not made much progress with us. The great scarcity of labor in the agricultural West should give an impetus to the application of portable steam engines to agriculture.

Two new and useful alloys have been added to the list of those already well known. These consist of "Aich's Austrian metal, and Aluminum bronze; the former consisting of 67·63 parts, by weight of copper; 40·22 parts spelter; 1·86 parts iron, and about ·84 parts of tin: the bronze consists of 90 parts copper and 10 of aluminum. Aich's metal is about double the strength of common gun metal, and the bronze, which is of a beautiful gold color, is nearly as strong as wrought-iron. It is too expensive yet for making the different parts of working machinery, but for ornamental articles it is highly prized.

The manufacture of watches, chiefly by ingenious and delicate machinery, has become an established and successful American art, and it is probable that, instead of importing watch movements from the Old World, we shall ultimately export them to Europe; and, like American clocks, they may become timekeepers to the denizens of all lands.

We have thus alluded to various topics relating to manufactures, inventions and commerce, and might have extended the list of subjects to much greater length; but we have said sufficient to arrest the attention of those who are devoted to progress and improvement, so that a fresh and intelligent start may be made for the new stage of life's journey in 1864.

MANUFACTURE OF COAL OIL.

The manufacture of oil from coal, by distillation, has been extinguished in the United States by the large supplies of cheap petroleum. But we notice by our foreign exchanges that coal oil is manufactured upon an extensive scale in Scotland, and the business there is upon the increase, competing with imported petroleum. If our oil wells were to cease flowing, the manufacture of coal oil would be resumed, of course; because there are extensive beds of cannel coal in Pennsylvania, Ohio, Kentucky and Virginia, from which illimitable quantities of this oil could be made. There are several points of difference between the rock oil and the coal oil. From the coal, pure benzole is obtained, and from this product the beautiful aniline red, crimson and purple colors so much admired are manufactured. Such products have not been obtained from petroleum, for if pure benzole exists in the natural oil, the quantity is so limited that it has not been appreciated. The benzine of petroleum is a different substance from the benzole of distilled coal. Another product of distilled coal, differing from that of petroleum, is its heavy oil that is used for lubrication in Europe. Oils of different specific gravities are derived from petroleum, but the heaviest is said to be inferior to that obtained from coal for lubricating machinery. A great improvement in the distillation of coal has lately been effected in Scotland. It consists in admitting superheated steam of a very high temperature into the vertical retorts while distillation is going on. The product is nearly doubled, the oil clarified, the disagreeable odor modified to a certain extent, and the retort kept clean.

PATENT OFFICE REPORT FOR 1862.—The engravings for the above work have been completed by Messrs. Jewett & Co., of Buffalo, to whom we are under great obligations for proof sheets. It is almost needless to add that the artistic execution of these illustrations is characterised by that superior excellence which marks the generality of the work done at the establishment of Messrs. Jewett. We have also received from them their sample pamphlet of line engraving, which, for beauty of typography, will, we are confident, command the attention of the printing fraternity.

THE rifled muskets made by the "Savage Arms Co.," Middletown, and rejected by the government inspector, are sold to a New York concern for $7 per gun more than the Government price. It is not a serious job for the Company, therefore, if the guns are all rejected; and Government probably buys them of other parties at an increased price.

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IMPROVEMENTS IN THE ARTS AND SCIENCES.

There exists in England a Society for the encouragement of the Arts and Sciences, which numbers among its members many of the best and most talented persons in the United Kingdom. Prince Albert, when living, took an active part in the proceedings of this institution, and aided its objects by every means in his power. Whether it was the comfort of the working-classes which engrossed his mind, or whether the perfection of some rare and beautiful work of art, intended to give pleasure to more cultivated intellects, his energies, time and money, were equally interested and devoted to the fullest accomplishment of the duty in hand.

In pursuance of its object to encourage the arts and render Great Britain first in all that pertains to civilization, the Society offered premiums varying in amount from $500 to $100 for the best inventions or discoveries in the arts and sciences. They also publish lists of certain substances, articles, fabrics, instruments, machines, colors, processes, &c., &c., in daily use, which are to be the subjects of special premiums. For some improvements medals are offered, which it is supposed bear a high value; not so much, perhaps, for their intrinsic worth as for the honor conferred by them upon the recipient. We transfer to our columns a number of the subjects for which prizes are offered, not with the idea of inducing competition among our countrymen for the possession of the premiums, as that is not permitted, we believe, by the Society; but mainly with the object of placing before our readers, in pursuance of the design of the SCIENTIFIC AMERICAN, the latest and most pressing wants of the age we live in:

Goldsmiths' Work.—For the best essay on Ancient Goldsmiths' Work.

Bronzes.—For the best essay on the manufacture and casting of Bronzes, and on bronze washes.

Molds for Metal Casting.—For the production of a material to be used in the formation of molds for casting bronzes and other molten metals, so as to enable the casts to be produced without seams.

Pigments.—For an account of the various pigments used in the Fine Arts, with suggestions for the introduction of new and improved substances.

Substitute for Wood Blocks.—For the discovery of a substitute for the blocks used by wood-engravers, so as to supersede the necessity of uniting several pieces of wood.

Photographs on Enamel.—For the best portrait obtained photographically and burnt in in enamel.

Photographs on China.—For the production of a dessert or other service, in China or earthenware, ornamented by means of photography, and burnt in from an impression obtained either directly from the negative, or from a transfer from a metal plate obtained directly from the photograph.

Photographs on Glass.—For a table service in glass ornamented by means of photography, under similar conditions to the above.

Photographs on Windows.—For the production commercially of ornamental glass for windows by means of vitrified photographs.

Fluoric Acid.—For a substitute for fluoric acid to be used for engraving on glass, which shall be free from noxious fumes.

Reproducing Designs for Printing.—For a rapid means of reproducing artistic designs or sketches, for surface printing by machinery, such process to provide for lowering portions of the work to fit it for steam printing.

Rollers for Calico Printing.—For any important improvements for facilitating the production and economising the cost of engraving rollers for printing calicoes and other fabrics.

Doctors for Calico Printing.—For the best material for, and form of "doctors" for calico printing machines, which shall obviate the several objections to those now in use.

Aniline Colors.—For a means of fixing upon cotton and other fabrics all the ordinary aniline colors, so that the dyed fabric will effectually resist the action of soap and water, or cold dilute alkalies.

Naphthaline.—For a process for converting the naphthaline of gas works into alizarine or madder-red.

Turkey Red.—For an essay, with the results of experiments, on the manufacture of Adrianople red.

New Scarlet Dye.—For the production of a scarlet dye for cotton.

Murexide Red.—For rendering murexide red more permanent, when exposed to the atmosphere and sulphurous vapors.

Bleaching Wool.—For an account of any important improvements in the bleaching of wool.

Lakes for Carriages.—For the production of cheap purple and yellow lakes, of good quality, suitable for carriage builders, &c., and not liable to fade or change color.

Mordants.—For a treatise on the mordants employed in the dyeing of cotton, wool and silk.

New Green Dye.—For an account of the "green dye from Malda," as shown in the Indian department at the International Exhibition of 1862, including original researches, giving methods of fixing the same upon cotton and other fibers and yarns.

Green without Arsenic.—For the manufacture of a brilliant green color, not containing arsenic, copper, or other poisonous materials.

Chlorophyll.—For the manufacture of chlorophyll from grasses, suitable for dyeing silk and other fabrics of a green color.

Green Dyes.—For the manufacture of green dyes from coal or wood tar.

Ultramarine.—For an artificial ultramarine, not liable to alteration when thickened with albumen and fixed by steam.

Colors for Dyeing, &c.—For the discovery of oxy-naphthalic acid, a preparation of chloroxy-naphthalic acid, or for a treatise on the application of Laurent's colors to dyeing and calico printing.

Trade in Foreign Dye Stuffs.—For an essay on the influence of the Aniline series of colors upon the trade and commerce in foreign dye stuffs.

Thickening Colors.—For the introduction of any substance the use of which will essentially economise the cost of thickening the colors and sizes used in dyeing and dressing fabrics.

Substitute for Egg Albumen.—For a thoroughly decolorised blood albumen, or any economic and efficient substitute for egg albumen for calico printing.

Use for Yolk of Eggs.—For a new, large and economic use for the yolks of eggs, with particulars of the mode of preparation and preservation.

Uses of Seaweed.—For the extraction from seaweed of any substance or preparation capable of extensive application as a dye, drug, thickening, tanning agent, or any other generally useful product.

Clays.—For an account of the mode of occurrence, and of the uses of Cornish, Devonshire and Dorsetshire clays, and the quantities annually worked.

Artificial Stone and Terra Cotta.—For an account of the various artificial stones and Terra Cottas introduced and employed for purposes of construction, stating their properties, advantages and imperfections, and their relative cost.

Lighting and Ventilating Mines.—For an account of the methods at present in use, in the various coal-mining districts, for ventilating and lighting the mines, with suggestions for their improvement.

Copper Smelting, &c.—For an account of the various commercial copper ores, of the smelting processes, and the methods by which the precious metals can be separated from copper.

Tin.—For an account of the treatment of tin and its application in the Arts and Manufactures, and of recent discoveries of new sources of supply.

Wolfram.—For an account of the modes by which wolfram can be separated from other ores; and of the uses of Tungsten in the Arts.

Menaccanite.—For an account of Menaccanite or Iserine, and suggestions for obtaining Titanium from these ores.

Titanium.—For the best essay upon titanium, with suggestions for extracting and utilising the metal.

Smelting Zinc.—For an account of the processes now in use for smelting zinc ores, with suggestions for their improvement.

Sulphur and Arsenic.—For the best account of the production of sulphur and arsenic from the metalliferous ores of the United Kingdom, with statistics of the use and export of these substances.

Mining Machinery.—For improvements in the machinery for dressing poor ores of tin, lead, &c.

Regenerative Furnaces.—For the best account of the structure and application of regenerative furnaces to manufacturing purposes.

Locomotives for Tunnels.—For the best locomotive engine for working in tunnels and underground railways, so as to avoid the injurious effect of ordinary engines.

Ropes for Mines.—For an account of the comparative value of chains, hemp and wire ropes for drawing ores from mines, giving the practical result of experiments.

Pumping Engines.—For an account of the relative merits of the different kinds of engines used for drawing water from mines.

Plumbago.—For the discovery of graphite in Australia, of a quality and in quantity calculated to be commercially useful.

Aluminium.—For any new or improved process for the manufacture of aluminium which, by cheapening its cost, may render it applicable to many purposes for which it cannot now be employed.

Silicium.—For the best essay upon silicium, and its uses.

Melting Cast Steel.—For an easy and cheap method of melting cast steel in large masses.

Agricultural Steam-Engine.—For the production of an efficient agricultural steam-engine, capable of use on the farm, and of being made available as a traction engine, either on tramways or common roads, for carrying farm produce and manure to railway stations.

Brewery Plant.—For a descriptive account of improved designs for the construction and plant of breweries, especially in the arrangements for boiling, cooling, hoisting, pumping, washing, attemperating, cask-washing, &c.

Hydraulic Engine.—For a small, simple, cheap and effective hydraulic engine, which, in connection with the ordinary water service of towns could be applied to lifts in warehouses, driving lathes, blowing the bellows of organs, and many other purposes where steam cannot be made available.

Lighting Railway Carriages.—For a system of lighting railway carriages with gas, each carriage to have an independent supply equal to the duration of the oil lamps now carried, and the system to be adaptable to existing carriages.

Railways.—For a complete and economic system of constructing railways in iron, with the necessary plant for working railways in tropical countries and the colonies.

Protecting Iron.—For the invention of an efficient method of protecting iron from the action of air and water, applicable to the various forms in which iron is used as a building material generally, and also to iron ships and armor-plated vessels.

Unsinkable Ships.—For plans or suggestions for the construction of an efficient and seaworthy vessel, of such materials and specific gravity, that when perforated either by shot or accident, she shall still maintain her floating power.

Iron Ships.—For the best and most convenient method of welding together the frame-work and covering of iron vessels, so as to dispense with bolting and riveting.

Diving Apparatus.—For an improved diving apparatus in which divers may work free from the influence of great pressure, and at greater depths than by means of the diving-bell, helmet, or other existing appliances.

Shoal Recorder.—For an instrument to indicate the depth of water under a ship's bottom to prevent danger when at sea or nearing land.

Smokeless Fuel.—For the discovery or manufacture of a new smokeless fuel, which shall not occupy more space, or be of greater weight than the fuel now in use; and shall be equal in amount of heating power, without liability to injure metals in contact with it.

Motive Power.—For the generation of motive power in sea-going vessels by any process whereby the necessity of carrying a large supply of coal may be avoided.

Electricity.—For any new process for producing or obtaining galvanic electricity, so that it may be obtained in large quantities at small cost.

Application of Electricity to Organs.—For the production of an organ in which, by the use of electricity or magnetism, tunes of greater length and variety than those ordinarily produced on barrel-organs may be performed mechanically.

Silk Bobbin.—For a bobbin for silk, which shall possess exact uniformity of weight, be incapable of being

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made heavier without detection, and which will not absorb moisture. The material employed must not be liable to chip, or to affect the color of the silk wound on it.

Lace Machinery.—For a mechanical substitute for hand-labor in running in the outline to figures in machine-wrought lace.

Woven Garments.—For the production in the loom, and introduction into commerce, of woven garments, suited for soldiers, sailors, emigrants, operatives and others, so as to economise the cost of production, and reduce the amount of hand labor.

Incombustible Paper.—For the production of an incombustible paper, so as to render the ledgers of commercial men, bankers, &c., indestructible by fire.

Dressing and Dyeing Skins.—For an account of the materials and methods at present employed in preparing and dressing skins, and the colors and treatments to which they are submitted in dyeing.

Dyeing and Dressing Leather.—For improvements in the method of dyeing or dressing Morocco or calf leather, in such manner as to prevent the surface from cracking in working, and to render it more fit to receive the gilding required in ornamenting books, furniture and other articles.

Leather Cloth.—For improvements in the manufacture of leather-cloth, or artificial leather, especially in imparting strength and durability, so as to fit it for the purposes of saddlers, harness-makers, trunk-makers, shoemakers, book-binders and others.

Substitute for Wool.—For any fibrous material available in large quantity and at a low price, capable of being used advantageously in textile fabrics, as a substitute for wool. The fiber should be from 1 to 6 or 8 inches in length, and suitable of being spun on the ordinary woolen or worsted machinery.

Substitute for Cotton or Flax.—For any new fibrous plant or substance which may be used wholly or in part as a substitute for cotton, flax, hemp, &c., or any new processes whereby useful fibers may be extracted from plants.

New Gums.—For any new substance or compound which may be employed as a substitute for india-rubber or gutta-percha in the arts and manufactures.

New Gums or Oils.—For any new gums or oils the produce of Africa, calculated to be useful in the arts and manufactures, and obtainable in quantity. Samples of not less than 25lbs. of gum, and 50lbs. of oil, to be transmitted to the Society.

Elastic Tubing.—For an elastic material for tubing, suited to the conveyance of gas, and not liable to be affected by alterations in temperature, or to be acted upon by the gas itself.

Glass.—For the production of glass by the use of the constituents of which the French sands are composed, such glass to be of a quality equal to that produced from those sands.

Color for Japanned Surfaces.—For the preparation of any color, applicable to the Japanned surfaces of *papier mache*, that shall be free from the brightness (or glare) of the varnished colors now used, but possess the same degree of hardness and durability.

Color for Slate.—For the preparation of light colors to be used in enameling or Japanning slate, which will stand the action of the heat from the fire without blistering or discoloration, and be sufficiently hard to resist scratches.

Electric Weaving.—To the manufacturer who practically applies electricity to the production commercially of figured fabrics in the loom.

Japanning Zinc.—For a process whereby the surface of articles manufactured in zinc may be economically japanned.

Coating Walls.—For the production of a cheap white enamel-like composition for the interior walls, &c., of houses, applicable to all ordinary surfaces, easily cleansed, not liable to crumble or chip, and capable of being tinted.

Substitute for Turpentine.—For a new and efficient substitute for turpentine, applicable to the manufacture of varnishes and to purposes for which turpentine is now ordinarily applied.

Substitute for Pitch.—For a cheap substitute for pitch, tar, &c., equally impervious to air and moisture, but non-inflammable.

Paper Machinery.—For a portable machine for planing the bars of a rag-engine roll true when the roll is in position. [Here is a good idea for some ingenious mechanic.—Eds. Sci. Am.] Also, for a cheap substitute for the expensive copper rolls now used in paper machines; a firm surface, not easily damaged by indentation, and not liable to oxidation, is essential.

Paper Material.—For the best essay upon paper-making materials, with suggestions for reducing economically the more refractory ligneous substances suited for paper-making, to a fibrous pulp, by mechanical or chemical means.

Rollers for Printing Paper-Hangings.—For a composition for feeding rollers for printing paper-hangings by cylinder machinery, similar in consistency and texture to the gelatine rollers used in letter-press printing, but adapted for working in water colors.

Paper-Hangings Colored in the Pulp.—For the manufacture of papers from colored pulp, bearing upon them designs, either colored or white, discharged after the manner of calico printing.

Lubricants.—For an account of the sources of supply, processes of manufacture, and relative value of the various lubricants employed in working machinery and rolling stock.

Red Oil.—For the solidification of oil by nitrous compounds, without the formation of red oil, or for the removal of the red oily body without injury to, or softening the solidified fat.

Improved Chemical Balance.—For the best chemical and assay balance, suitable for the use of students and experimentalists, which will, (with 600 grains in each pan) show a difference of ·005 or less. To be sold at a moderate price.

Cheap Spectroscope.—For the best and cheapest form of spectroscope.

Dialysing Apparatus.—For the best and cheapest form of dialysing apparatus, capable of being packed in a small compass, but of sufficient size to aid the country practitioner in the detection of poisons and adulterations, and in the preparation and purification of salts and drugs.

Incombustible Wick.—For the production of an incombustible wick, suitable for oil, spirit and other lamps.

Cyanogen Compounds.—For the economical production of cyanogen compounds for employment in the arts, or as manures.

Naphthaline.—For the discovery of a practical means of utilising naphthaline.

Oxygen Gas.—For a more economical process of obtaining oxygen gas than any in present use.

New Edible Roots.—For the discovery and introduction into this country of any new edible root, useful as food for man or cattle, and capable of extensive and improved cultivation.

Edible Seaweeds.—For a means of rendering seaweeds generally available as a wholesome vegetable food on board ship.

Improved Sugar Machinery.—For a practical report on any recent improvements in sugar machinery introduced into and adopted in the British or French colonies, or on the Continent.

Emigrants' Dwellings.—For the best essay (for the information of emigrants proceeding to new settlements,) descriptive of the means of treating existing natural products in any locality, such as earths, shells, chalks and limestones, woods, barks, grasses, &c., and applying them in the construction of dwellings. Diagrams and illustrations of the methods of applying materials should be given.

Colored Starches.—For the production of a series of colored starches, which can be applied to articles of dress, such as lace, &c., without injuring or staining the fabric, but at the same time give to them the required tints, and thus render them in harmony with other portions of dress.

Tobacco.—For an account of the cultivation, preparation and manufacture of the various kinds of tobacco and the commerce therein.

Refractive Power of the Eye.

By the refractive power of the eye, objects situated a little behind us are seen as if they were on a straight line from left to right. Pictures of external objects which are represented on the retina, are included in an angle much larger than one-half of the sphere at the center of which the observer is placed; from this point of view a single glance encompasses a vast and splendid panorama, extending to an angle of 200°. This is the result of the common law of refraction. All the rays of light passing through the cornea to the crystalline lens are more and more refracted in proportion to the angle at which they strike the spherica surface of the cornea. Consequently, the only objects which are seen in their true position are those entering the eye in the direction of the optic axis. By this refraction the rays which enter the eye at an angle of 90° are bent at 10°, and appear to come from an angle of 80°. This phenomenon produces a very curious illusion. When we are lighted by the sun, the moon, or any other light, if we endeavor to place ourselves in a line with the light and the shadow of our body, we are surprised to find that the light and the shadow seem not to be connected at all, and that, instead of being in a line, they appear bent to an angle of 160° instead of 180°, so that we see both the light and the shadow a little before us, where they are not expected to be. The eye refracts the line formed by the ray of light and the shadow, and the effect is like that of the stick, one-half of which being immersed in water, appears crooked or bent into an angle at the point of immersion. This enlargement of the field of vision to an angle of 200°, is one of those innumerable and wonderful resources of Nature by which the beauty of the effect is increased. Our attention is called to the various parts of the panorama which appear in any way a desirable point of observation, and we are warned of any danger from objects coming to us in the most oblique direction. These advantages are particularly felt in our crowded towns, where we are obliged to be constantly on the look-out for all that is passing around us.

Food and Breathing of Plants, Animals and Engines.

Carbonic acid, water and ammonia are the food of plants—simple forms of matter, which they take and mold into the complex organic forms of which the substance of plants consists. Animals feed upon these plants. Animals have not the power of producing complex organic matter, such as the simple inorganic forms of water, carbonic acid and ammonia. They receive their nutriment from plants, and the whole act of their lives is to take those highly organised forms produced by plants, and convert them again into the simple conditions of carbonic acid, water and ammonia, from which the plants derive their food. Look what a machine an animal is: how closely he resembles a steam-engine! A steam-engine in action takes fuel, which is its food, consisting of coal and wood, which are decayed vegetable combustible matter. A steam-engine takes in water, and so does an animal. A steam-engine breathes air, and so does an animal. A steam-engine produces, by the combustion of the air upon the fuel, a steady boiling heat of 12° by quick combustion; and the animal produces a steady animal heat of 98° by slow combustion. The steam-engine produces smoke from the chimney—that is, air loaded with carbonic acid and vapor. An animal produces foul breath from the windpipe, which is air loaded with carbonic acid and vapor. The steam-engine produces also ashes, which is part of the fuel which does not burn; and the animal produces refuse, which is a part of the food passing from the body unconsumed. The engine produces motive force or alternate push and pull in the piston, which acting through levers, joints, and bands, does varied work. The animal gives rise to motive force by alternate relaxation and contraction of the muscles, which, acting through levers, joints and tendons, does varied work; that is to say, an animal is, in all its chemical functions, a machine which is producing certain results by combustion; and it takes these complex vegetable and animal combustible substances and gives them out in a simpler form.

The Soda Trade.—M. Thibierge states that the soda trade, which had its origin in France, is now visibly falling off in the supply of raw material, which may now be found in greater abundance in foreign parts. To remedy this evil, M. Thibierge proposes to mix sulphuret of iron, or of iron and copper, which exists in vast quantities, with any combustible,—such as peat, lignite, coal or coal-dust, and then set fire to it. The result of the combustion would be ashes, containing metallic oxides and sulphate of soda, which might be easily separated and transformed into carbonate.

A new steam whistle, six feet high (?) and fifteen inches in diameter, has been erected at Colt's factory, Hartford, Conn. It can be heard all over the city.

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Amaurosis from the Use of Tobacco.

The following extracts are from the *Lancet* (London) and the *British and Foreign Medical and Chirurgical Review:*

"Dr. Mackenzie, in his great work on Opthalmology, expresses his belief that tobacco is a *frequent* cause of amaurosis, and adds, that 'one of the best proofs of tobacco being the cause of amaurosis is in the great improvement in vision—sometimes complete restoration—which ensues on giving up the use of this poison,' and cites a very striking case in illustration.

M. Sichel observes, that among cerebral amaurosis there are two forms but little known. One of these, observed in drinkers, he himself described as symptomatic of delirium tremens several years ago. The other, due to the use of tobacco and first indicated by Mackenzie, he once doubted the existence of. Subsequent experience has, however, convinced him of its reality; so much so, that he is now of opinion that there are few persons who have smoked during a long period more than five drachms of tobacco per diem without having their vision and frequently their memory enfeebled. Both these forms of amaurosis are characterized by the absence of well-marked symptoms of cerebral congestion, the symptoms vibrating between those of sthenic and asthenic amaurosis, and the surgeon remaining in uncertainty as to their seat and nature until the special cause is discovered. In treating them, discontinuance or diminution of the habit is a great and a difficult desideratum. Depletion, even local, should be employed with the greatest caution; and stimulating liniments or flying blisters may aggravate the symptoms. A purgative, consisting of equal parts of magnesia and cream of tartar, is an excellent means when the function of the stomach is active, alternating it with pills of gum ammoniac and aloes; but in the disordered stomach of drinkers, small doses of rhubarb and magnesia, given twice a day, one hour before meals, form a good corrective. Bathing the eyes and forehead with cold water and dry cupping or flying sinapisms applied to the extremities, are excellent adjuvants. M. Mercier, in corroboration of the unsuspected effects of tobacco in generating disease, related a case in which a cough, which had persisted for a year, and purpura, which had lasted for seven months, soon yielded after the cessation of smoking, which had been excessive."

Breathing Apparatus.

At a late meeting of the Academy of Sciences, M. Galibert described an apparatus for securing free and complete breathing to persons obliged to stay some time under water, or to penetrate into places filled with deleterious gases or smoke. This apparatus consists of a piece of wood, having the form and dimensions of the human mouth when open. To this piece of wood two India-rubber tubes are fixed, of any length, according to the exigencies of the case. The man engaged in the operation is further provided with a nose-pincher, or instrument for compressing the nostrils, so as to prevent the introduction of deleterious gas or of water, as the case may be. The operator puts the piece of wood into his mouth, and puts on the nose-pinchers; he stops one of the orifices with his tongue and inhales pure air from the other; after which he shifts his tongue to the latter orifice, and exhales his breath through the other. He continues thus regularly shifting his tongue from one orifice to the other, in the order of the inspirations and expirations; but even a mistake would be of little consequence. A man easily learns the use of the apparatus by a few minutes' exercise. This contrivance has the merit of requiring no preparation, thus affording a speedy means of giving assistance in the case of fires or of suffocation by water or gases. It might also be used in medicine for the complete immersion of patients in a bath, which might sometimes be advisable.

An Iron-Clad Man of the Past.

An exchange says:—"We examined, a few days ago, in the office of Attorney-General Galbrath, a very interesting historical relic, being a portion of the armor of one of the Spanish Knights who first invaded and explored the wilds of this Western continent. The armor was found in the neighborhood of Monticello, Jefferson county, in the State of New York. The portions preserved are the helmet, the vizor and gorget, and coverings for the arms. We understand that the rest of the armor was found, but has been inadvertantly lost or destroyed. This armor is of the most solid and substantial character, that for the head alone weighing fifteen or twenty pounds, and being impenetrable to musket or rifle balls. It is possible that the armor belonged to one of the expeditions of Pamphilo de Narvaez, which was lost in the country, or to one of the army of De Soto, and is about 350 years old—perhaps much older. The frame that could bear this iron incasement must have known the discipline of arms, and been strengthened in the battle and the breeze. The armor is of complete workmanship, strong rather than fine; and must have been as complete a covering for the human form as the armor of the ocean monsters that bid defiance to the rifle cannon shot of the present day. Probably, in future times, the iron-clads of our own day will be regarded as the curiosities of a past age, the utility of which will hardly be perceptible to our descendants."

How to Shoe Horses.

As many valuable animals are ruined by careless farriers, we give the following article, from the *Irish Country Gentleman's Journal*, in the hope that it will be the means of some reformation in this respect:—

"To shoe horses with ordinary feet we would suggest the following directions to the farrier:—With your drawing-knife take off from the ground surface of the crust as much as may represent a month's growth. Remember that there is generally a far more rapid growth of horn at the toe than at either the heels or the quarters. More, therefore, will require to be taken off the toe than off other parts; in other words, shorten the toe. Be careful to make the heels level. Having lowered the crust to the necessary extent with the knife, smooth it down level with the rasp. Round off the lower edge of the crust with the rasp. Do this carefully and thoroughly. If a sharp edge be left, the crust will be apt to split and chip. The preparation of the foot is now complete. It remains to fit the shoe to the foot. Let the shoe be made with a narrow web (¾-inch), or even width all round, except at the heels (direction No. 8), flat toward the sole, and concave to the ground. Turn up the toe of the shoe on the horn of the anvil. The degree of "turn-up" must be regulated by what you find necessary in each horse to make the wear nearly even all over the shoe. It will be found in practice that most horses take much about the same degree of "turn up." Make five counter-sunk nail holes in each shoe, viz.: three on the outside, and two on the inside. Make the anterior hole on each side immediately posterior to the "turn up." Let the second and third holes on the outside divide evenly the remaining space on the heel. Let the second hole on the inside be opposite to the second hole on the outside. Let the nail-holes be punched coarse, *i.e.*, nearly in the center of the web, brought out straight through to the other side. This may be done with safety where a good crust has been preserved. Fit the shoe accurately to the foot. It must be as large as the full unrasped crust, but no part must project beyond. The shoe must be continued completely round toward the heels, as far as the crust extends. The web must be narrowed at the heels, so that its inside edge may cover the line of the bars and no more. Slope off the heels of the shoe in the same direction as the heels of the crust, so as to prevent the possibility of their catching in the hind shoe. Select nails that will fit exactly into and completely fill the nail holes. Twist off the clenches as short and stubby as possible, and lay them down flat with the hammer, and let the pincers during this time be firmly pressed against the heads of the nails. The clenches are not to be filed either before or after turning down, nor is a ledge to be made in the crust to receive the clenches. For ordinary hind feet the pattern of shoe in common use is recommended, but with a clip on each side, immediately anterior to the first nail, instead of one only at the toe. This double clip keeps the shoe steadier in its place than the single. The web should be made somewhat wider at the toe than at other parts, in order to allow space for the thorough sloping of its inner edge. For reasons which have been already explained, the hind foot does not require to be shortened at the toe like the forefoot; but the other directions given above—namely, as regards lowering the crust, rounding its lower edge, accurate fitting without rasping, punching the nail holes coarse, nailing and clinching with the total absence of rasping, paring, opening the heels, cutting away the frog or bars, &c.—apply equally to hind as to fore feet. Six nails—viz., three on each side—are needed for the hind shoe. Without the third nail on the inside, shoes are apt to "twist" on the feet. The horse is now shod. Nothing more must be done for the sake of what is called appearance. The best iron only should be used for shoes. Good iron makes a light shoe wear as long as a heavier one of inferior metal.

Exemption from Draft.

We have heard of a great many dishonorable and mean make-shifts resorted to by individuals to avoid drafts. We don't blame them; some kinds of drafts are excessively disagreeable—we don't mean Uncle Sam's at this time—but the "windy" affair that searches every pore in the body in the hope of finding some entrance to the vital parts of the frame. On another page our readers will find an engraving of a patent weather-strip, which we will warrant to procure them an exemption from the most dangerous of all drafts, at a tithe of the cost charged by unscrupulous men for obtaining exemption from military duty. We know whereof we speak in recommending this invention, for we have this weather strip in use in our own dwelling, and we are satisfied that at the present high prices of fuel it will save enough in a single winter to pay the whole expense of its application, while it renders the house much more comfortable, and, at the same time, excludes all street dust, which is so annoying to housekeepers in windy weather. The illustration and description on another page explains the construction of the strip, from which it will be seen that it is both cheap and durable. The enterprising inventor, Mr. Brown, informed us a few days ago that he had nearly fifty men employed in this city alone, putting the weather strip upon dwellings, stores, banks and public buildings. This is another instance of the value of the "little things" in every-day use; when once patented they become the source of an immense business.

Night and Day Traveling.

Many people are averse to traveling on railways by night, having the impression that there is greater liability to accident. Statistics tend to show the reverse to be true. A writer in the *Railroad Advocate* sums up the case for night trains pretty strongly. "At night all work on the track ceases, and there are but few trains running. Draw-bridges are generally all closed; switches are not so liable to be misplaced, as they are less used; the signals for trains are more certain, for lights are used and can be seen further. The engineer has nothing to divert his attention by night. Rocks and trees are no more liable to fall upon the track by night than by day; nor are cars more likely to break at one time than another. The passenger in a night car is more apt to keep his seat and remain quiet by night; and that is the safest thing he can do in a railway car."

An Unfounded Claim.

The *Mechanics' Magazine* of Dec. 4th, has a letter from a correspondent who asserts that the armor-plating of the *Furitan* and *Dictator* class of ships was invented in England by an individual called "Walker," and the editor adds, in a paragraph, that this person is entitled to all the credit of the same, he having patented it seventeen months ago. It is proper that we should inform the gentleman that the armor in question is the invention of Capt. Ericsson, and is the same that was applied to the original *Monitor:* an addition of two or three inches of iron, or substituting a solid plate for two single ones, does not amount to a change of plan. The ideas may be similar, but they were conceived on this side of the Atlantic before Mr. Walker was ever heard of in this connection.

THE WATER OF THE DEAD SEA.—A French gentleman, M. Roux, publishes a paper on the composition of the waters of the Dead Sea,—showing that it contains about 9½ per cent. of the chloride of magnesia, 6 per cent. of chloride of sodium, 3 per cent. of chloride of calcium, 1½ per cent. of chloride of potassium, and traces of bromide of magnesium, sulphate of lime, hydro-chlorate of ammonia, carbonate of lime, oxide of iron, alumina, and 79½ per cent. of pure water.

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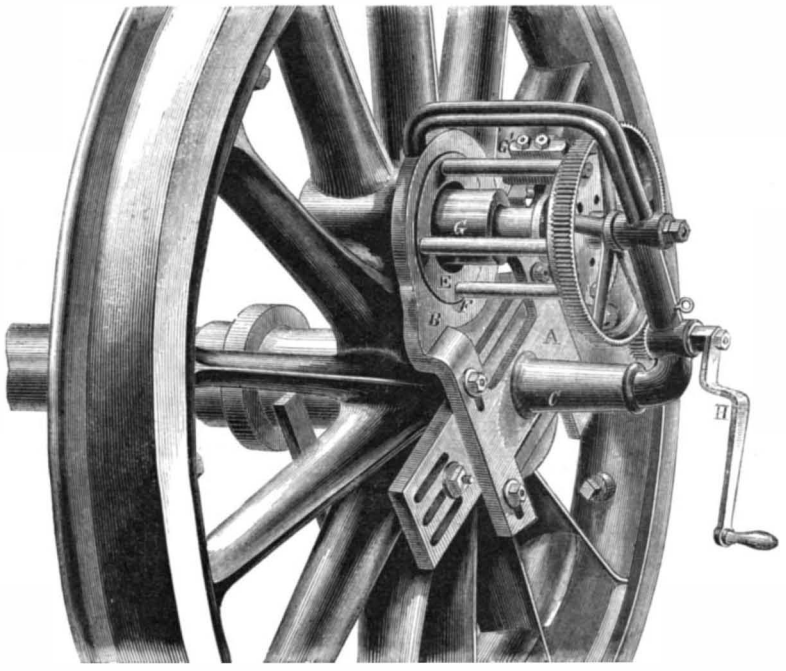
Improved Lathe for Crank Pins.

When locomotives have been in use for such a length of time that new brasses are required to be put in the parallel rods, it is generally found that the crank pins are worn eccentric and out of truth, to such a degree that it is impracticable to fit new brasses to them, so that the wheels will "tram," or, in other words, so that the distance between the surface of the several pins shall remain the same in every part of the revolution of the wheels.

The practice heretofore has been to remove the wheels from the engine, pull out the old pins and substitute new ones, although the old ones were large enough, if true, to use still longer. This process proves expensive, from the fact that so much time is spent in the operation, as frequently new brasses are required when the engine does not need "jacking up" for other work. The object of the machine illustrated herewith is to turn the pins true with their original centers, making them as good as new, except the slight reduction in diameter. The machine is light, portable and capable of being applied to wheels either under the engine or detached from the same, and is to be worked by hand power. When horse-power is convenient, however, the crank maybe removed and a pulley substituted, thus expediting the work. One man can turn a set of pins in two days.

The construction of this portable lathe, for such we may call it, is as follows:—The cast-iron bed-plate, A, is fastened to the arms and body of the wheel by bolts and clamps, as shown. This bed-plate carries another casting, B, which has oblong holes in it for the purpose of vertical adjustment; this casting and the column, C, as well as the brace, B, are all in one piece, and serve as a support for the cutting apparatus. This latter consists of a circular head, E, fitted easily in a seat turned for it at F, and running upon a shaft at its opposite end, where a set screw is provided that takes the old center in the pin, G, to be turned. A small head-stock, G', is fitted to a cross-bar, not shown in the engraving, and the tool is screwed up in the stock, as usual; suitable means, not easily shown in the position of the machine, as taken, are provided for feeding the tool over the work. It will be seen that when the crank, H, is turned, the pinion drives the large spur wheel, which, being attached to the revolving head, E, carries the tool around the pin with a slow and steady motion; at the same time the tool is fed across by the lateral feed before mentioned; the operation is precisely similar to that of a lathe. This machine can, by means of its construction, be easily adjusted to cranks of any length of stroke, and shifted sideways or upward to suit circumstances. It has been suggested after years of attention to, and experience with, locomotive engines; it is extremely simple, and furnishes a very cheap and convenient method of fitting crank pins to receive new brasses. When it becomes necessary to renew a set of brasses, it will save from $40 to $50 on each engine.



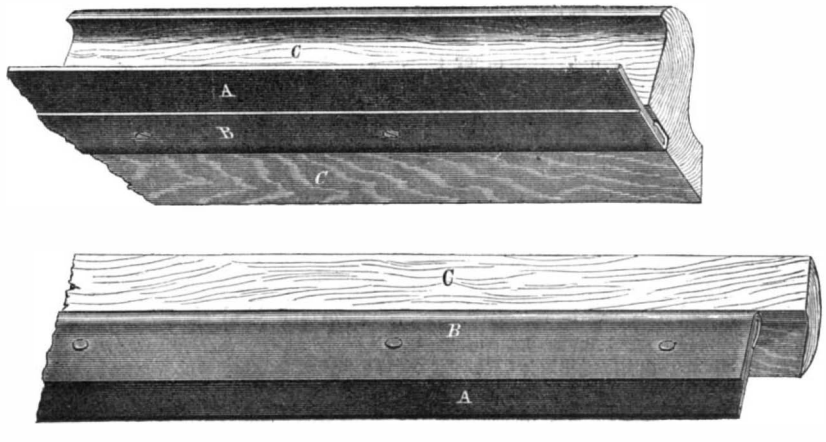
CHENEY'S LATHE FOR CRANK PINS.

This machine has been in successful operation for nearly a year on the Chicago, Burlington and Quincy Railroad, at Galesburgh, Ill., and was patented through the Scientific American Patent Agency, Aug. 11, 1863. For further information address the inventors, S. S. and D. Cheney, Box 1,028, Galesburgh, Ill.

Improved Metallic Weather Strip.

Very few people have any idea of the amount of fuel wasted in heating houses that are too thoroughly "ventilated" for comfort. In time the best constructed houses become uncomfortable in cold weather from the shrinkage of the doors and windows. Fresh air is highly desirable and very necessary to health, but people generally choose to regulate the admission of the same to suit their own tastes, and have no fancy for piercing drafts and arrowy rushes of cold air creeping up the back, or blowing never so gently down their necks. Insidious streams of air rushing through every unguarded crack or crevice, are so many agents of death, and in delicate constitutions very often sow the seeds of disease which ends fatally. To obviate such evils and to economise fuel, which is so expensive at this time, the weather strip herewith illustrated has been introduced. It is merely a strip of vulcanised india-rubber A, covered with a sheath of zinc, B; thus constructed, the strip is nailed to a molding prepared to receive it, in the manner fully shown by the engraving; these moldings are made of any shape, size or style, to suit the windows to which they are to be applied. The inventor says, in relation to this weather strip;

"In order to produce a perfect thing, the elastic substance in these improved strips is so secured to the metallic back as to expose both the edge and side of the yielding substance, and thus provides against all defects in the window or door to which it is applied, by presenting to the contact of its surfaces a substance possessing the capacity of self-adaptation



BROWN'S METALLIC WEATHER STRIP.

thereto. It is so constructed that the nails which hold the molding in place also pass through the weather strip, in addition to the special fastening applied to the strips themselves.

"The strips are applicable to the crevices of shrunken doors or windows of private and public buildings, railroad cars, steamboats, show cases, picture frames and various other purposes. Their application to cabin and pilot-house windows of steamboats, effectually stops the clattering noise occasioned by the vibration arising from the machinery. They produce the same effect on all doors and windows in stormy weather. They can be applied to every description of door and window. They are neat and ornamental in appearance, when covered with a neat molding of walnut, cherry, oak wood or white enameled. They are permanent and durable; being made of metal, they are not liable to shrink or warp, and are equally good in summer or winter, as they effectually exclude heat and dust as well as cold. The price places them within reach of all. There is no longer a necessity for double sashes, as the new strips entirely supersede their use, at one-tenth the cost, and are a saving of coal alone of fifty per cent. in the winter season. This invention was patented on February 18th, 1862. Local agents wanted in every State, city or town in the country. For further information, address Patent Metallic Weather Strip Co., No. 644 Broadway, corner Bleecker street, New York.

Chapped Hands.

The discomfort and annoyance of chapped hands is very great and might be avoided if people would take proper care in drying their hands after washing them. Cold cream is a very good remedy for this and other cutaneous irritations, and the following recipe will enable any one to prepare it where the article cannot be procured at the shops:—Melt together in a water bath (that is, a vessel immersed in boiling water, like a carpenter's glue-pot) eight ounces of fine neat's-foot oil or almond oil, three ounces of spermaceti, and one and a half ounces of white wax; when thoroughly melted pour the whole into a pan, which, in winter, must be kept very warm by the fire; then, with a clean flat stick, beat the mass continually until it is uniform in body; pour in half a pint of rose or orange-flower water, and one-fourth of an ounce of spirit of bergamot, or any other perfume desired; then beat rapidly again until the whole of the water and spirit is taken up by the unctuous portions. If made in winter all the materials must be warmed as mixed, or the mass will be lumpy. Lard or sweet oil may be substituted for the almond oil. If care is observed the mass will be as white as snow.

Extension of Patents---Special Notices.

Lyman Kinsley, of Cambridgeport, Mass., having petitioned for the extension of a patent for an improvement in cast-iron car wheels, granted him on March 12, 1850, it is ordered that said case be heard at the Patent Office, Washington, Monday, Feb. 22, 1864. All persons interested are notified to appear and show cause why said petition should not be granted.

Also, John C. Dodge, of Dodgeville, Mass., having petitioned for the extension of a patent granted him May 14, 1850, for preventing fibers from winding on drawing rollers in spinning machines, it is ordered that said claim be heard at the Patent Office, Washington, April 25, 1864. All interested are notified to appear and show cause why said petition should not be allowed.

Also, John T. Davy, of Lansingburgh, N. Y., having petitioned for the extension of a patent granted him on March 12, 1850, for a furnace for heating sad-irons, it is ordered that said claim be heard at the Patent Office, Washington, Feb. 22, 1864. All persons interested are notified to appear and show cause why said petition should not be granted.

Parties opposing the extension of claims must file their objections at the Patent Office, in writing, at least twenty days before the day of hearing.

THERE are now 40,000 negroes armed and in the service of the Government.

IT is calculated that the wool clip of Minnesota the present year will not be less than 500,000 lbs.

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WANT OF AMERICAN OCEAN STEAMSHIPS.

Several years since (May 16, 1857, page 285 Vol. XII, SCIENTIFIC AMERICAN, old series,) we directed the attention of our shipowners and capitalists to the great increase of European steamers in the Atlantic trade, and we urged upon them the policy and necessity of engaging in the construction of screw propellers. We said "the longer they delay the weaker and less able will they become in the struggle, while their rivals will be growing stronger and stronger." Since that period we have on several occasions recurred to the subject, and have advocated the construction of iron screw propellers in preference to wooden vessels. On page 305 Vol. I (current series) we said: "We have lost, and are still losing, our ocean carrying-trade, principally from a class of steamers, the efficiency of which our people do not yet appreciate; we mean iron screw propellers." At that period we had three lines of American steamers engaged in the Atlantic trade, now we have not one. It is indeed true that our steamships which had been engaged in this commerce, are now employed by Government in necessary and important services, but it is none the less a subject of regret that the American ocean carrying-trade has been almost destroyed for want of fast steamers; for if we had a sufficient number of these they would bid defiance to the *Alabama* and all its congeners, and would have maintained our ocean trade in its integrity. The Boston merchants have been somewhat aroused to a sense of the importance of this question, and a company has been incorporated with legislative authority to raise a capital of two millions of dollars to establish steam navigation between Boston and Liverpool. A meeting was lately held for the purpose of devising measures to establish the line at once, and it was stated that the present means of communication between that port and Europe were totally inadequate to the wealth and importance of the city, as her imports reached her by other ports, and exports which could be shipped from Boston sought other channels. We believe that a line of steamships running between Boston and Liverpool could be sustained under good management. To this end a first-rate class of vessels must first be provided, and these must be afterward conducted with economy and ability.

As we anticipated ten years ago, screw steamers are fast driving sailing vessels from the ocean trade. In 1852, the tunnage of foreign-going steamers entered inward at Liverpool was 188, 715 tuns; in 1862, it was 595,339; in 1863 it has increased to 756,420 tuns. In about ten years the foreign steam trade of Liverpool has more than quadrupled. At present there are eight different lines of Atlantic steamships —all European—besides a considerable number of transient steamers. Six of these lines have contracts for carrying the mails, and in the aggregate they embrace fifty-five vessels; the Canada Company have lately made contracts with Clyde engineers to build three more new first-class iron screw propellers. Other companies have also entered into contracts for building several new steamers, as those which they now possess are inadequate to meet the demands made upon them. An important fact in connection with the success of these European steamers is, that with very few exceptions they are Clyde-built vessels. Even all the German steamers which trade between Europe and New York have been built on the river Clyde in Scotland, and several new vessels for these continental lines are now being constructed in the same quarter. Formerly all the Cunard steamers were wooden paddle-wheel vessels, but all those built for five or six years past are of iron, mostly screw propellers; and hereafter this class, we understand, will be preferred on account of their economy in fuel. These are important facts, worthy of the profound attention of our capitalists and shipowners, as several new lines of steamers are projected in England; and if these should succeed in engrossing more of our carrying-trade, it will be difficult, if not impossible, hereafter, to restore this branch of our commerce.

PHOTOGRAPHY AND PRINTING.

On several occasions recently, we have referred to the efforts which have been made in Europe to apply photography to the art of printing. A late number of the *Popular Science Review* affords abundant evidence of the satisfactory progress made in this art, as its frontispiece is embellished with a printed copy of a full page of the London *Times*, taken by the photographic process, and reduced to a space of four by five and a half inches. It is like a miracle of art to see six columns of that large newspaper copied by the power of sunlight and printed in such a manner, with every letter as distinct as if it had been traced with the point of a diamond. The advantages of an art by which copies of objects can be taken direct upon a lithographic stone or metal plate and employed for printing, are self-apparent; as, from one original, thousands of copies may be taken with the aid of a printing press. Fox Talbot, the inventor of photography, seems to have first published in 1853, a description of a process of photographic printing. A solution of gelatine, containing a little bichromate of potash, is poured upon a steel plate and allowed to dry. The object to be copied is interposed between the metal plate and sunlight, being laid upon a plate of glass that is pressed upon the metal plate. That portion of the gelatine which is exposed to the light on the plate becomes brown in color and insoluble, while those parts shaded from the light remain unchanged. When the metal plate is afterward placed in water, those portions of the gelatine not acted upon, are dissolved, while those which have been exposed to the light remain. By pouring nitric acid upon the plate, those parts from which the gelatine has been dissolved are etched, leaving the protected parts untouched. From such a plate copies may be taken in the common press employed for copper-plate printing. This process is imperfect, because it will not give the half-tints of pictures, although it will produce good copies of leaves and objects which have well-defined prominent lines. Mr. Talbot has made an improvement for producing the half-tints, but it is very difficult to manage. Another process has been brought forward by M. Pretsch. A metal plate, or one of glass is treated with gelatine and the bichromate of potash, in the same manner as has been described; this is exposed to light under a photograph or an engraving, and is afterward moistened with water but not washed, as in the Talbot method. The moisture causes the parts of the gelatine not acted upon by light to swell up above the other parts of the surface, and a mold in wax is then taken from the plate from which an electrotype in copper is taken for printing. This process is very effective for large prints, but is not suitable for producing fine delicate work. Another process is employed for producing copies of maps at the Ordnance Office, Southampton, England. The metal plate is prepared with gelatine and the bichromate of potash, in the same manner as described; a photograph of the map is then taken on glass, and pressed against the prepared plate, which is then exposed to the light. A roller charged with lithographic ink is passed over the face of the plate and its whole surface is blackened. After this the plate is soaked in warm water, when the soluble portions of the gelatinized surface are dissolved out, leaving behind the picture or copy in ink. This is now placed in contact with a smooth plate of zinc and submitted to heavy pressure, when the ink is transferred from the copy to the zinc plate, and from this with suitable preparation, copies may be printed in a lithographic press. This process has been very successfully applied to the copying of manuscripts and prints.

This art is still in its infancy, but we think it is ultimately destined to achieve great results. The prominent advantage of photography consists in its quick production of fac-similes, and this art combined with engraving and printing, by making the same chemical agencies which produce the picture prepare the plate for printing, possesses incalculable advantages. Copies of objects of natural history, rare engravings and manuscripts, are now taken by photography and printed; but the art is capable of still further improvement and a more extended application.

"BOSSES" AND WORKMEN.

As a theme for an essay, the relation of Labor to Capital, or the reverse, affords an opportunity for many finely-drawn theories concerning the duty of each. The real nature of the relations which should exist between labor and capital appear to us to consist in combining, as far as possible, the two interests, and making both work together for mutual advantage. Both are formidable, and exert an immense influence for good or evil. The injurious effect which capital can produce on the welfare of the community is well shown by the combinations which from time to time take place in certain branches of trade; where by the accumulation of large sums for specific purposes, speculators are enabled to force the market prices of articles far beyond their actual value. So also when capitalists coalesce for the purpose of cheating the laborer of his hire, by depressing wages below the standards of value, or so that the necessaries of life cannot be procured, another example is furnished of the unjust and general baneful effect which capital may produce on the people.

Labor is also exacting in its demands, at times, and when it fancies it has the sweep of the market, so to speak, takes advantage of the circumstance like other speculators, and in some instances is enabled to carry out its objects, in others not; depending principally upon the ability of Capital to withstand the demand made.

Now when we have two great forces given, the problem is—how to employ them to the best advantage. If a man builds double-cylinder engines he does not set them so that the power of one shall act against the other, but he connects both to the same shaft with the crank at right-angles, opens the throttle and away they go. Thus it should be with "bosses" and workmen; let each pull on the same shaft; each is a mighty force singly, but when their conjoint relations are deranged they shake the whole world. An earthquake does not exhibit more disastrous physical effects than do strikes or monopolies upon the social systems of civilized nations. Trades whose interests conflict with those of capitalists, or are made so to do by the perversity or shortsightedness of the members composing them, find that in the course of time their wages decrease instead of increase, and that their social standing is diminished. Some trades are afflicted with chronic strike, and appear to be at continual variance with their employers.

It may be in such cases that the wages are too small to live upon, or the want of harmony may proceed from other causes too complicated to be discussed at present; whatever the reason, it is certain that trades continually on the strike cannot get on, because the attention of the members composing them is turned from the trade to other subjects. Our sympathies are with the working classes, male and female, because capitalists are quite able to take care of themselves, and even if their business is destroyed can fall back upon other resources. But with the laborer no such course is possible; his capital is his hands and skill, and it is for this reason that we deplore strikes and the results which spring from them. These results are briefly—destitution of the strikers, bad feeling engendered between the bosses and men, and disorganization and derangement generally antagonistic to the best interests of the men themselves. There are doubtless times when trades are justified and compelled in self-defence to rebel against the terms offered by employers; but as a general rule labor is better

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paid in this country than anywhere else on the globe, and a skilled workman can always command a handsome remuneration for his services. The relations of labor and capital are bound up in three words—they are identical—and they should work together for mutual advantage.

A TOUR AMONG THE IRON-CLADS.

A recent tour of inspection made in one or two of the largest ship-yards, where iron-clads are now being built for Government, reveals the fact that they are in a forward stage of progress, and likely to be entirely completed at no very distant day.

THE "DUNDERBERG."

So much has been said about this vessel, that it seems almost supererogatory to add anything more; nevertheless it may be interesting to know that the work of plating is going forward with dispatch, and that, from present appearances, the ship will be ready long before her engines. The carpenters' work, inside and out, is finished—that is, comparatively little remains to be done; odd jobs here and there not being taken into account. The engine kelsons are all laid, and massive ones they are, too; the coal-bunker and bulk-head surrounding the boiler compartment are also in place; and so far as the carpenters are concerned we presume the vessel might be launched in a week. The below-water-mark plates are being fixed on the side, a layer of sheathing paper being placed between the plates and timber. The plates themselves are being laid vertically, not horizontally as usual, and are 4½ inches thick in the middle, tapering to 3 and 3½ inches at the extreme ends.

The casemated fortress on deck is also completed, so far as the main structure is concerned. The plating is not applied, and only the massive timbers, which constitute the casemate proper, are erected on deck. The port-holes for the guns are about the size of an ordinary window-sash—say three feet square, a few inches more or less; they are ten in number: three on each side, two forward and two aft. In one of them a rough template of what we took to be a 9-inch gun was placed on a temporary carriage, for the purpose of seeing what depression could be given to the weapon.

The *Dunderberg's* stern aft projects monitor-fashion about 25 feet, we should say at hazard; not having measured it we cannot speak by the rule. To protect this from the force of the sea, the under side of the tail is laid with narrow joists some three inches apart. Seas on striking these joists will be broken into spray, and the shock of impact much weakened; the main timbers of the tail are above these slats, and exert their full strength in supporting the structure. The engines of the *Dunderberg* are building at the Etna Iron Works. They are to be horizontal cylinders, 100 inches in diameter by four feet stroke of piston, having slide valves; from appearances it will be a long time before they are finished. No day is fixed for the launch of the ship.

Mr. Webb is also building two other magnificent steamers for the Pacific Mail Steamship Company; one of them is 340 feet long, 44 feet beam, and 31 feet deep; and is to have a beam engine of 105 inches cylinder by 12 feet stroke. The vessel will be, in all respects, similar to the *Constitution*. The other ship is to be 300 feet long, 43 feet beam and 27 feet deep, intended to run on this side of the Isthmus. When these ships are finished, the Company will possess a fleet which, for speed and comfort, cannot be surpassed in the world.

At Greenpoint, we found

THE "PURITAN" AND "ONONDAGA."

The first is the consort of the *Dictator*, and the latter a monitor battery of two turrets, contracted for by Mr. George Quintard. The outlines of the *Puritan* are still covered by the scaffolding upon her sides; the armor on the hips or shelves is not yet in place, although the carpenters are busily engaged in preparing the way for it. The deck is not completely laid, although in a forward stage of progress. The lower parts of the ship are still in an unfinished condition; the engine room is in a state of chaos, and only the cylinder bolts, pillow blocks and some other parts, are in place. This part of the ship has been much delayed by the strike of the machinists, and also an accident which happened to a cylinder of the *Dictator*; one of these being smashed last winter, necessitated the substitution of one intended for the *Puritan*. Mr. Rowland informed us that, so far as he was concerned, the ship might be launched in forty days.

The *Onondaga* has a large force of mechanics employed on her, and will soon be ready for sea. The turret bolts do not go clear through, but a jacket two inches thick is slipped over the main part of the turret; between the jacket and the turret a rust joint is driven—that is, cast-iron borings mixed with sal-ammoniac and borax, or urine—this is driven in tightly between the jacket and turret. The whole structure is of the same thickness as the ordinary turrets. No shot can drive bolts into the turret with this arrangement, as they do not go through the outer jacket. The *Onondaga* has two 15-inch guns and two 200-pounder Parrotts. One of the 15-inch guns is turned off at the muzzle, and the port is enlarged two inches; by this means the piece can be run out of the port, as is ordinarily done. In a short time it is hoped that the vessel will be able to take her place in the fleet.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list:—

Gun Chassis.—This invention relates to chassis working on center pintles and to the application to the traverse wheels of such chassis of a system of toothed gearing operated by a hand crank or its equivalent, for the purpose of producing the traverse movement. In all previous applications of gearing in connection with the traverse wheels, the gearing has been applied only in connection with the wheels in the rear or with those in front of the chassis, generally with the former, and in case of the setting of the platform, and from other causes, the wheels to which the gearing has been applied have been liable to a failure to bear upon the traverse circles or segment rails, *in* which case the gearing would be useless, and the use of handspikes would have to be resorted to to produce the traverse movement. This invention consists in applying a system of gearing to both the front and rear sets of traverse wheels, in such a manner that both sets are caused always to operate together so that whether both sets or only one set has a bearing on the traverse circles or segment rails, the gearing will not fail to produce the traverse movement. S. J. Ashley, of San Francisco, Cal., is the inventor of this improvement.

Working Gun Carriages.—The object of this invention is to enable heavy guns, placed in turrets or otherwise, to be worked with the least possible number of hands and to reduce the recoil in the greatest possible degree. The invention consists, first, in the employment for controlling and checking the recoil of a gun carriage and for holding the same stationary while loading and at other times, of a self-acting friction brake or clutch detached from the carriage but geared therewith by a suitable system of toothed gearing. It consists, secondly, in the employment of the same system of gearing by which the gun carriage is geared with the aforesaid friction brake or clutch, for the purpose of running the carriage out for firing or of moving the carriage in or out for any other purpose. It consists, thirdly, in so constructing and combining the parts of the aforesaid friction brake or clutch, and so applying a movable stop in combination with them, that by the mere shifting of the stop, the brake or clutch is brought either to a condition to check the recoil or secure the carriage, or to a condition to permit the carriage to be run out or in freely. Capt. John Ericsson, of New York city, is the inventor this improvement.

Fan Blower.—The principal object of this invention is to make a fan blower which will produce the same effect when worked in either direction in contradistinction to ordinary fan blowers, which work in scroll-shaped cases, and consequently act in a different manner when turned in one than when turned in the opposite direction. The invention consists in an annular air chamber surrounding a conical cavity, and communicating with the same at its apex in combination with triangular wings working in said double conical cavity in such a manner that, on imparting to the wings a rapid rotary motion, the air passing through the central openings into the double conical cavity, is forced in the annular air chamber, whence it is conducted by a suitable tube or tubes to the place or places where the blast is to take effect. William Winter, of Plainfield, N. J., is the inventor of this improvement.

SaccharineLiquid Evaporator.—This invention consists in the employment of two or more pans placed one above the other in combination with two or more furnaces, suitable flues and dampers, in such a manner that the heat from the first or lowest fire can be made to strike the first pan, or turned off from that pan and made to strike the second pan or any other pan above the first, and the heat from the second fire can be made to strike the second or any other pan above, and so on, and consequently the second pan can be exposed to the combined heat of the first and second fires, the third pan to the combined heat of the first, second and third, or of the second and third fires, and so on, and thereby the heat of each pan can be graduated to any desired extent, and the evaporation of the juice effected in a short time, with comparatively little fuel and labor and in the best possible manner. J. C. Chesney, of Abingdon, Ill., is the inventor of this improvement.

Burglar-proof Safe.—This invention consists in interposing between the walls of a safe a series of balls of cast-iron or other hard metal or material, arranged in such a manner as to be enabled to work, play, or turn freely between the walls and present a perfect barrier to a drill, router, or other burglar tool; the balls, in consequence of being allowed to turn freely, preventing a drill or router from acting upon them, and being of different diameters so as to effectually preclude a drill or router being used without coming in contact with a ball. The invention also consists in the employment of a flange or plate applied to the safe and in connection with the outer plates of the same, in such a manner as to prevent the outer plates from being wrenched or torn off from the same. The invention further consists in the application of a steel plate to one of the inner walls of the sides of the safe, for the purpose of protecting the inner plates or prevent them being broken and dislodged should the outer plates be wrenched off from the safe. Isaiah Rogers, of Washington, D. C., is the inventor of this safe.

Weighing Scales.—The object of this invention is to obtain a scale for weighing without the use of detachable weights, and one which will admit of being readily counterpoised or balanced at any time, when not properly in a balanced state, so as to insure perfect accuracy. To this end the invention consists in attaching, by means of a rod, a plunger to one end of the scale beam, said plunger being immersed in quicksilver or other fluid or semi-fluid contained within a suitable vessel, said fluid or semi-fluid serving to buoy up the plunger and causing the latter to serve as a counterpoise of varying capacity according to the size of the articles to be weighed. H. W. Catlin, of Burlington, Vt., is the inventor of this improvement.

Rice-polishing Device.—This invention relates to a new and improved machine for polishing rice after the same has been divested of its hulls. The object is to obtain a machine of the class specified which will be more efficient in its operation than those previously devised, by admitting of the free discharge of the dust or flour from the screen, so as to prevent the choking or clogging of the same; also by preventing the wire-cloth of the screen from being bent or getting out of proper shape or form; and further, by having the polisher arranged so as to be capable of being adjusted, and giving the screen a rotary movement as well as the polisher. Silas Dodson, of Bloomsburg, Pa., is the inventor of this improvement.

Port Closers for Forts and War Vessels.—This invention consists in the employment, for the purpose of closing the ports of vessels-of-war or the embrasures of forts, of two rollers, each being made to rotate independently of the other and provided with a cavity in one side, so that by turning the rollers in such a position that the cavities face each other an opening is obtained which is not wider than the muzzle of the gun and allows of giving to the gun any desired elevation or depression, and at the same time said rollers allow of training the gun to an angle of 45 deg. or more with the beam, and if the rollers are both turned in such a position that the cavities face the interior of the vessel or fort, the port or embrasure is firmly closed. The invention consists also in the application of semi-circular flanges embracing

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the backs or inner sides of the rollers at top or bottom, in such a manner that any strain brought to bear on the outside of the rollers is sustained by said flanges and the gudgeons of the rollers are entirely relieved and not liable to get injured by shot or shell which may strike said rollers. The invention consists, finally, in the employment of india-rubber or other suitable packing inserted into the faces and backs of the rollers, in such a manner that said rollers will close perfectly water-tight and prevent the water from entering the ports or embrasures. W. S. Auchincloss, of New York city, is the inventor of this improvement, which has also been secured by foreign patents.

Valve Gear of Steam Engines.—This invention relates more especially to valve gear which is permanently and positively connected both with the induction or cut-off valves of the same and with a regulator, but which is yet variable under the control of the regulator to regulate the velocity of the engine by means of those valves. The principal object of the invention is so to connect the regulator with the valve gear, that a slight force only need be exerted by the regulator to materially alter the admission of steam to the cylinder, and by that means make the cut-off sensitive to slight variations in speed ; and to this end it consists in a novel system of right and left-hand screws, racks and pinions, combined with the regulator and with the levers or their equivalents, with which the valves are connected, whereby friction rollers or other devices attached to the said levers are shifted upon the varying face or between the varying faces of a cam by which the operation of the valve is produced, and thereby obtain the necessary variations in the operation of the valves to regulate the velocity of the engine. Tisdale Carpenter, of Providence, R. I., is the inventor of this improvement.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING DECEMBER 15, 1863.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

40,892.—Printing Press.—John F. Allen & R. W. McGowan, New York City :

I claim the cylinders, B F F′ F″, in combination with the reciprocating form bed, H, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to a new and improved printing press for printing with a plurality of colors simultaneously or at one operation, the sheet to be thus printed upon being required to pass but once through the press. The invention consists in the employment or use of a rotary cylinder, in combination with a series of cylindrical forms or type-cylinders, and a reciprocating form or type bed; all arranged to effect the desired end.]

40,893.—Operating Gun Carriage.—S. J. Ashley, San Francisco, Cal.:

I claim the gearing together of the front and back traverse wheels by means of a system of gearing in such manner that the power is applied to produce the motion of both sets of wheels simultaneously by power applied through a crank shaft or its equivalent at or near the rear end of the chassis, or in such position as may be most convenient, substantially as and for the purpose herein specified.

40,894.—Apparatus for Amalgamating Precious Metals.—J. B. Attwater, Chicago, Ill.:

I claim the employment or use of one or more reciprocating frames, H, provided with arms or leaders, f, having bars, h, or their equivalents attached to form elevators, in connection with the tray or box, A, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention consists in the employment or use of one or more reciprocating frames composed of a series of bars constructed in such a manner and arranged in connection with a tray or vessel to hold the quicksilver and "tailings," that both the small and large particles of metal contained in the tailings will be brought in contact with the quicksilver, and a thorough amalgamation effected.]

40,895.—Port Closer for Vessels of War.—Wm. Stuart Auchincloss, New York City:

I claim first, The employment or use for a port hole closer of two rollers, A A, each being made to rotate ndependently of the other and provided with a cavity, b, as described, so that by turning the rollers to the proper position an opening is obtained which allows of giving to the gun any desired elevation, or of training the same to an angle of 45° or more, substantially as set forth.

Second, The combination of the flanges, E, with the rollers, A A, constructed and operating substantially as and for the purpose herein shown and described.

40,896.—Paddle Wheel.—E. H. Bailey, Philadelphia, Pa.:

I claim the two sets of inclined floats, D and D′ and E and E′, in combination with the annular plates, G and G′, when the two sets of floats and the whole of the parts are constructed and arranged as set forth for the purpose specified.

40,897.—Corrugating Machine.—John G. Baker, Washington, D. C., assignor to Samuel J. Seely, New York City. Ante-dated Dec. 6, 1863 :

I claim, first, Corrugating sheet metals, &c., between alternating die-jaws (or their equivalents), in such a manner as to form but one bend or angle in the sheet at a time.

Second, The die-jaws, 1, 2, 3, and 4, constructed and operating substantially as described.

Third, The dogs, I, and J, constructed and operating substantially as described.

Fourth, Feeding the sheet of metal by its own gravity in combination with the corrugating jaws (or their equivalents), substantially as described.

Fifth, The shoes, O, constructed and operating substantially as described for the purpose of making either waved or ridged corrugations with the same set of dies or die jaws.

40,898.—Signal Switch for Railroads.—Horace H. Barnes, Mexico, N. Y.:

I claim the arrangement of the segment rack, F, pinion, I, shaft, G, lantern, J, and box, K, with the switch lever, C, and frame, D, in the manner herein shown and described.

[This invention consists in a novel application of a lantern or lamp to the lever of a switch, as hereinafter shown and described, whereby the lantern or lamp will be turned automatically as the switch is moved or adjusted, and different colored lights exposed to show the position of the switch during the night.]

40,899.—Machine for bending Angle Iron.—David Bell, Buffalo, N. Y.:

I claim shaping angle cars for iron ship building by means of the table, A, (including the adjustable pins, G), and sliding pressure bar, B, and jaws, C, operated by a screw, substantially as described.

40,900.—Corn Planter.—Wm. F. Blandin, Macomb, Ill.:

I claim, first, The adjustable shares, i i, constructed, arranged and operating as and for the purposes herein specified.

Second, I claim the combination and arrangement of the crank shaft, O, provided with the arms, n, the lever, b, and connecting rod, m, for the purposes shown and set forth.

Third, I claim the removable combined tube and drill point, e, provided with the pin, p, in combination with the hopper of a corn planter, substantially as herein shown and described.

Fourth, I claim the combination and arrangement of the roller, C, provided with the pins, d, the crank shafts, h and c, the connecting bar, a, seed cylinders, L L, and combined tube and drill point, e, constructed and operating as and for the purposes herein described.

40,901.—Gaiter Boot Protector.—Frank M. Blodgett, Boston, Mass.:

I claim the combination of the anklet or leglet, A, and the frontlet gaiter, B, the same being arranged and applied together substantially as specified.

I also claim the combination and arrangement of the leg band or back piece, C, with the frontlet gaiter, B.

I also claim the combination of the anklet, A, the frontlet, B, and the back band, C, the whole being made, arranged and applied together, substantially as specified.

40,902.—Gate.—Franklin F. Blood, Janesville, Wis.:

I claim a gate balanced by a weight, B, or by a box cased up on the standards, C, and filled with sand or other substance, when combined with a friction roller, b, and hanging shives, D, and used for the purposes as herein described and set forth.

40,903.—Washing Machine.—I. J. K. Boyce, Napoleon, Ohio :

I claim the inwardly inclined presser board, B, attached to curved rods, C, which extend through slots in the top of the box, A, and are operated by pendulum arms, D, in combination with the outwardly inclined end, g, and curved corner, h, of said box, all constructed and operating in the manner and for the purpose herein shown and described.

[This invention relates to an improvement in that class of washing machines, in which the clothes are exposed to the action of a reciprocating pressure by placing them between said presser and the end of the box or tub.]

40,904.—Protecting Lead Pipe against the action of Water.—Leopold Brandeis, Brooklyn, N. Y.:

I claim the production of sanitary pipe by the application at 212° Fah., of a strong solution of a sulphide of an alkali to the inside of lead pipe or lead cisterns or leaden vessels for the purpose of forming a sulphide of lead, so that water will afterward not act on the pipe or vessel and cannot get contaminated by running through or by remaining standing in such pipe or vessel.

40,905.—Valve Gear for Steam Engines.—Tisdale Carpenter, Providence, R. I.:

I claim the employment in a steam or other engine of one or more right and left-hand screws, f f′, pinions, h h, and racks, i i, combined with each other with the regulator and with the induction valve operating mechanism, and co-operating substantially as described to produce the necessary variations in the operation of the valves for the regulation of the engine.

40,906.—Balance.—H. W. Catlin, Burlington, Vt.:

I claim, first, The plunger, J, connected to the scale beam, E, and immersed in quicksilver or other fluid or semi-fluid contained in a proper vessel, K, to operate as and for the purpose specified.

Second, The weight indicator formed of the diagonally-graduated plate, M, connected to the beam, E, as shown in connection with one or two stationary index plates, O O, arranged substantially as set forth.

40,907.—Corset.—L. L. Chapman, Camden, N. J.:

I claim in ladies corsets, constructed to have the breast puffs, elastic shoulder-brace straps, and stay-pieces, as described and set forth, the employment of the short, straight clasping steel springs, arranged in front so as to be entirely below and free from the puffs, B B, as herein described and set forth, in combination with the single cord lacing, D D, in the back of the corset and adjustable in front as described, the said springs and lacing operating together in the said shoulder-brace corset combination, substantially in the manner described for the purposes specified.

40,908.—Evaporator for Saccharine Liquids.—J. C. Chesney, Abingdon, Ill.:

I claim the employment or use of a furnace, A, with two or more fire-places, B C, one above the other, in combination with a vertical flue, E, two or more horizontal flues, B′ C′, and suitable pans, B* C*, and dampers, b′ c′, all constructed and operating in the manner and for the purpose substantially as shown and described.

40,909.—Cultivator.—Marcus Milton Clark, Industry, Ill.:

I claim the vertically-adjustable stirrups, f, and hinged plow beams, F, in combination with the frame, A, running on wheels, B, which can be turned in either direction by a hand lever, D; all constructed and operating in the manner and for the purpose herein shown and described.

[This invention relates to an improvement in that class of cultivators which straddle one row and pass over the growing plants, and the principal object of the improvement is to enable the driver to govern the motion of the cultivator so that the same follows the sinuosities of the rows with care and facility.]

40,910.—Hauling or Driving Chains or Belts.—Wm. Clissold, Dudbridge, England :

I claim the compound links, a, with the wood-filling pieces, d d, in combination with the coupling plates, b, or their equivalent, substantially as described.

40,911.—Clasp for Harness Tugs.—L. D. Cowles, Armada, Mich.:

I claim the box, C, in combination with the crimped or corrugated plate, B, and strap, A, and the plate or lever, D, one or more, provided with the clamps formed of the projections, b b, and roller, c, or their equivalents, all arranged to operate as herein set forth.

[The object of this invention is to obtain a simple and efficient device which will supersede the ordinary tug buckle, and is an improvement on a clasp for the same purpose, for which Letters Patent were granted to this invention, bearing date Feb. 17, 1863. This invention consists in the employment or use of a box provided with a lever and clamp, in connection with a corrugated plate and strap.]

40,912.—Clasp for Harness Tugs.—L. D. Cowles, Armada, Mich.:

I claim the box composed of two parts, A B, connected together by the pins, e, on the part, B, fitted in eccentric slots, f f, in plates, C C, pivoted to the part, A, substantially as shown to form a new and improved clasp for harness tugs as set forth.

[This invention relates to a new and improved clasp to supersede the ordinary tug buckle for harness, and it consists in the employment or use of what may be termed a box formed of two parts connected together by means of pins and eccentrics arranged in such a manner that the two parts may be opened and closed with the greatest facility, and one strap firmly secured in the box and connected with the other strap which is permanently secured to the box, and the strap first named readily released so as to be "taken up" or "let out" when necessary.]

40,913.—Apparatus for lifting and removing Wheel Tires.—George W. Creamer, Fillmore, Pa.:

I claim, first, The tongs, A A′ a2, checks, a3, rod, C, arm, D, handle, E, and bar or ear, F, employed in the manner described to elevate and convey wheel tire.

Second, In combination with two pairs of tongs, I claim the rigid rod, B, operating as described to adapt the tongs to act in conjunction, and either grasp or release the tire.

[This is a very useful invention for the purpose of taking the tire from the fire in which it is heated and setting it upon the wheel without exposing the operators to heat or smoke, or compelling them to support the weight in a constrained posture.]

40,914.—Washing Fluid.—Parmer R. Cross, Lowell, Ind.:

I claim the washing fluid, composed of the herein described ingredients, in the proportions specified, substantially as and for the purposes set forth and described.

40,915.—Cultivator.—John R. Davis, Bloomfield, Iowa :

I claim in combination with the pivoted cultivator frames, I J J′ K L, also the hooked foot levers, N N′ n′, rods, P, and staples, Q, all constructed, arranged, and operating as specified, so that either or both the frames may be readily raised by the feet of the driver and retained by hooking the treadles into the staples, Q, as explained.

[By means of this invention the plow on both sides may be raised either separately or simultaneously by the feet of the operator, and retained at any desired height.]

40,916.—Skate Fastening.—C. T. Day, Newark, N. J.:

I claim the bars, F F I I, constructed, arranged, and applied to the skate, substantially as shown, so as to be capable of being moved in a longitudinal and lateral direction and clamp or grasp the sole of the boot or shoe, in the manner and for the purpose specified.

I further claim the screw rod, J, and nut, H, applied to the bars, F F I I, to operate in the manner and for the purpose set forth.

[This invention relates to a new and improved mode of attaching the skate to the boot or shoe and it consists in the employment or use of clamps arranged and applied to the skate in such a manner that a combined lateral and longitudinal adjusting movement is given them for the purpose of grasping the sole of the boot or shoe and firmly securing the skate to the same. The invention further consists in operating the clamps by means of a screw-rod and nut, arranged with the clamps in such a manner that all of the latter will be operated or moved simultaneously in securing the skate to the boot or shoe.]

40,917.—Machine for Polishing Rice.—Silas Dodson, Bloomsburg, Pa

I claim the employment of the rings, R, in combination with the screen, H, and the bars, i, in the manner and for the purpose herein shown and described.

In combination with the inclined adjustable rotating polisher, I, I claim giving an independent rotary motion to the inclined screen, H, as and for the purpose herein shown and described.

40,918.—Hair Dye.—Dominique Duprat, New York City :

I claim a hair dye composed of the ingredients herein specified and mixed together, substantially in the manner and about in the proportion set forth.

[This invention consists in a composition of pomade or fat scented with some perfume, nitrate of silver and gallic acid mixed together so as to produce a hair dye capable of restoring the original color to hairs of all shades.]

40,919.—Operating Gun Carriage.—John Ericsson, New York City :

I claim, first, The employment for controlling and checking the recoil of a gun carriage and for holding the same stationary while loading, and at other times, of a self-acting friction brake or clutch detached from the carriage but geared therewith, substantially as herein described.

Second, The employment for the purpose of running the gun-carriage out or in, of the same system of gearing by which the gun-carriage is geared with the aforesaid friction-brake or clutch, substantially as herein specified.

Third, So applying and arranging the two portions, Q R, of the friction-brake or clutch in connection with the gearing by which the gun is worked, and so arranging a movable stop to act on teeth provided on one portion of the brake or clutch that by a mere shifting of the stop the brake or clutch is brought either to a condition to check the recoil or prevent the movement of the carriage, or to a condition to permit it to run freely, substantially as herein specified.

40,920.—Artificial Fuel.—Thomas M. Fell, Brooklyn, N. Y. Ante-dated Dec. 4, 1863 :

I claim the within-described artificial fuel manufactured from anthracite and asphaltums in the manner described.

40,921.—Skate.—Martin Feurstein, Williamsburg, N. Y.:

I claim a skate iron, A, provided with two or more hinged dogs, a b c, as and for the purpose described.

Also inserting the dog or dogs in slots, d, as and for the purpose specified.

[The object of this invention is to enable unpracticed skaters to strike out with their skates without the liability of slipping backwards or in a lateral direction, whereby they are caused to loose their balance and to fall.]

40,922.—Forage Ration.—Matthew Fletcher, Louisville, Ky.:

I claim the forage ration composed of proper relative proportions of grain and rough food when the former is secured and preserved within the latter, both constituting one bale or package, made substantially in the manner and for the purpose described.

40,923.—Clothes and Hat Hook.—George B. Fowler, New York City :

I claim the claw, a, and brad or brads, b, in combination with the bracket, B, of a hook, A, constructed and operating in the manner and for the purpose substantially as herein shown and described.

40,924.—Compound Oil for Burning and Lubricating.—R. A. Gilman, Woodland, Wis. Ante-dated Nov. 21, 1863 :

I claim combining animal fats, such as tallow and lard, &c., with mineral hydro-carbon oils, such as petroleum, coal oil, &c., by mixing them together in about the proportion herein specified, and heating them to a temperature of 195° Fah. (more or less), with or without the addition of lime and sulphate of zinc, for the purpose described.

[This invention consists in heating animal fats, such as tallow, lard, &c., together with mineral hydro-carbon oils, such as petroleum, coal oil, &c., in such a manner and to such a temperature that said animal fats unite and combine with the mineral oils and the mixture becomes liquified and suitable for lubricating and burning purposes.]

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40,925.—Manufacture of Gas.—W. H. Gwynne, New York City:

I claim the employment or use of the cupola, A, surrounded by the annular space, a, in combination with the exhauster, H, applied and operating substantially in the manner and for the purpose herein shown and described.

Also the within-described process of producing illuminating gas by exhausting the products of combustion from a cupalo or its equivalent through a quantity of incandescent material, substantially as specified.

40,926.—Fruit Ladder.—James Hannan, Lyon, Mich.:

I claim, first, Connecting two ladders together in such a manner by means of a pin or otherwise that the two shall form a double self-sustaining ladder, capable of being adjusted at various hights by separating more or less the two sections in combination with the side braces, B, when arranged as and for the purpose described.

Second, I claim the side braces, B, constructed in such a manner that they can be adjusted in any direction.

Third, I claim the frame, G G, the stationary table, C, and adjustable platform, D, when constructed as described, and used in combination as and for the purposes set forth.

Fourth, I claim the table attached to the lower portions of the frame, G G, and the manner of securing the same to the ladder.

Fifth, I claim the adjustable platform upon the top of the table, constructed and operating as and for the purpose specified.

Sixth, I claim the standard, H, crane, I, and pulley, J, in combination with the basket, L, operating as specified.

Seventh, I claim the elevated ladder, F E, for the purposes set forth.

Eighth, I claim the windlass, M, in combination with the elevated ladder, rope, K', and basket, L, when arranged and operating substantially as and for the purpose specified.

Ninth, I claim the platform, N, when arranged as and for the purpose set forth.

40,927.—Pump.—Thomas Hansbrow, Sacramento, Cal.:

I claim the combination of the swinging screw bolts, C, and slotted plates, a, with the valve chest, A, and air chamber, B, in the manner herein shown and described.

[This invention relates to an improvement in a pump for which Letters Patent were granted to this inventor, bearing date Feb. 5, 1861. The within-described invention relates to an improved mode of securing the air-chamber to the valve-chest of the pump, whereby a firm and durable connection of the above-named parts is obtained, and one which will admit of being manipulated with the greatest facility, in order to secure the air-chamber to the valve chest and to detach it therefrom.]

40,928.—Car Replacer for Railroads.—Robert Harper, Chelsea, Mass.:

I claim the car restorer or combination of the arched plate, A, the descending plane or part, b', and the two flanches, a b, projecting from opposite sides of the said plate, A, substantially as specified.

40,929.—Steam Boiler.—R. S. Harris, Dubuque, Iowa:

I claim the boiler composed of the shell, A, filled to the top with tubes, a a, the water jacket, B, the annular flue, D, extending uninterruptedly round the shell, and the drum, F, containing both steam and water and communicating with the shell and the jacket, which are both filled with water, the whole combined substantially as herein set forth.

[This invention consists in a novel arrangement of tubes, flues and water jacket, in connection with the cylindrical body or main portion of the boiler, and with an upper water and steam drum whereby a boiler is obtained which is very safe, durable and economical of fuel.]

40,930.—Hay and Cotton Press.—G. W. Hart, Aurora, Ind.:

I claim the mode of supporting the frame of a vertical hay press clear of the ground, by means of the pedestal, B, and nut, c, or their equivalents, substantially as and for the purposes set forth.

40,931.—Pantaloon Strap.—Samuel Heller, New York City:

I claim a pantaloon strap consisting of a center piece, A, of leather, two strips, B, of elastic india-rubber fabric, and two end-pieces, c, of leather, all arranged in relation to each other as and for the purpose herein shown and described.

[This invention consists in a strap with a centerpiece of leather, two strips of shirred india-rubber and two end pieces of leather, so that all the advantages of the leather are preserved and sufficient elasticity is imparted to the straps to prevent the pantaloons from being exposed to an injurious strain.]

40,932.—Apparatus for Concentrating ore.—James Hepburn, Mokelumne Hill, Cal.:

I claim, first, Exposing the ore as the same passes through the sluice, A, to an upward current of water from the receiving box, B, substantially as and for the purpose specified.

Second, The employment or use of one or more receiving boxes, B, arranged in relation to the aperture or apertures, a, in the bottom of the sluice, A, and operating in the manner and for the purpose substantially as herein set forth.

[This invention relates to an improvement in the manner of sluicing or separating the gages and rock or earthy matter from the ores of valuable metals after the same have been reduced to powder by stamping or crushing, so as to effect by the automatic action of water a perfect separation of the ore from the rock in which it was disseminated.]

40,933.—Mode of treating Fish Water for use in Dyeing, &c.—J. B. Herreshoff, Bristol, R. I.:

I claim the employment or use of Menhaden fish water in the dye tub, or as an agent for dyeing, substantially in the manner specified.

Also, the within-described process of treating or preparing Menhaden fish water previous to its application in the dye tub by exposing it to a temperature of about 300 Fah., under a pressure of about 60 pounds to the inch as herein set forth.

[This invention consists in the employment or use of the aqueous liquor pressed from Menhaden fish during the process of extracting oil therefrom for precipitating tarrates in the dye tub or as an agent for dyeing.]

40,934.—Sugar Evaporator.—James High, Walnut Fork, Iowa:

I claim the combination with the finishing pans, D D', mounted on wheels attached to their sides as herein shown and described of the guard, C, supported on either the stationary or moving pans and projecting over the space between the two in the manner and for the purposes specified.

[This invention consists in the arrangement of a transverse track at the rear end of the flue in combination with two wheeled pans and with a stationary heating pan, in such manner that the juice after it has been boiled in the heating pan and freed from scum can be conveniently ladled over into either of the wheeled pans, and exposed to a moderate heat over the rear end of the pan for the purpose of finishing the sirup, and that one of the said wheeled pans can be emptied while the contents of the other are being finished.]

40,935.—Cultivator Teeth.—H. T. Hooker, Skeneateles, N. Y.:

I claim the standard, A, provided with the reversible share, C, detachable mold-boards, B B', and pulverizer, D, the whole constructed, arranged and operating in the manner and for the purpose herein set forth.

40,936.—Clothes' Airers.—Lorenzo Horn, Wolfboro' New Hampshire:

I claim the spring, F, upon tube, E, arranged and operating in combination with spring, D, and groove, c, of rod B, substantially as and for the purpose herein specified.

40,937.—Fanning Mill.—Henry Kelly and William Franklin, Decorah, Iowa:

First, we claim the shoe vibrating on a single central vertical pivot, B, or its equivalent as and for the purposes described.

Second, The strap, H, or its equivalent as and for the purposes described.

40,938.—Mill for Crushing Sugar Cane.—G. H. Laub, Macomb, Ill.:

I claim the pendant, J, attached to the sweep, G, and provided with the vertical slot, e, when used in connection with the stationary cylinder, C, and roller, H, as and for the purpose set forth.

[This invention consists in the employment or use of a stationary cylinder in connection with a sweep having a pressure roller attached to it, the lathe being provided with a toothed or gear wheel at its upper end which works in a sunken gear at the upper end of the stationary cylinder; the stationary cylinder being provided with an annular trough at its lower end, and the sweep having an attendants' seat attached to it, and also a cane-guide and cane-rack, all being arranged in such a manner as to form an economical, durable and efficient mill for the purpose specified.]

40,939.—Faucet.—John Leitch, Buffalo, N. Y.:

I claim the combination and arrangement of the abutment, D, valve, E, diaphragm, H, and operating screw, G, substantially as described.

40,940.—Stump Extractor.—Hiram Lemm, Leonidas, Mich.:

I claim the lever, F, with the pawls, G G, attached in combination with the ratchet, K, and drum, I, with chain, J, attached, all arranged on a mounted frame, A, to operate as and for the purpose herein set forth.

I further claim the pole, L, provided with the spike, M, in combination with the chain, N, all arranged as and for the purpose specified.

[This invention consists in the employment or use of a lever provided with two pawls and fitted on the upper part of a mounted frame, in combination with a ratchet and drum fitted in the mounted frame, and all arranged to operate in such a manner and in connection with a chain so as to admit of stumps being extracted and heavy bodies elevated and transported from place to place with the greatest facility. The invention also consists in a simple and novel means employed for holding the mounted frame in proper position when the machine is in operation.]

40,941.—Weather-strip.—H. Ogborn, Green's Fork, Ind. Ante-dated Dec. 6, 1863:

I clain the bolts, G G, in combination with the curved piece, c, piece, D, and springs, H H, the whole being arranged, constructed and operated in the manner and for the purposes set forth.

40,942.—Grain Cleaner and Separator.—J. W. Patterson, Monticello, Minn. Ante-dated Dec. 12, 1863:

I claim, first, The revolving spiral arms, l l, attached to the shaft, B, where said arms are used in connection with the beater, G, perforated cylinder, H, as and for the purpose specified.

Second, The bar, S, attached to the upper part of the shoe, N, to prevent the choking or clogging of the hopper as specified.

[The object of this invention is to obtain a machine of simple construction which will effectually separate oats from wheat, and also separate smut and all other impurities from the grain.]

40,943.—Side-saddle Tree.—Tyree Pogue, Madison, Ind.:

I claim a side or ladies' saddle tree, formed and constructed in the manner hereinbefore specified and represented.

[By this invention a seat of improved form is produced without any building up process.]

40,944.—Wheel Vehicle.—C. J. Preston, Harlem, Ill.:

I claim the arrangement of the transoms, a g, with recesses, c r, fitting respectively over the bolster, d, and center bar, h, and connected with the truck frames, B C, in the manner and for the purpose substantially as herein shown and described.

[This invention consists in a double truck frame the fore part of which is so arranged that the cross timber behind forms the slider, and the transom, through which the king bolt passes, is framed into the center of each of the oblique cross timbers or hounds, and the transom of the rear part of the truck is supported by longitudinal timbers, both transoms being fitted, that in front to the centerpiece and that in the rear to the bolster by means of recesses, in such a manner that said transoms are allowed to spring down until they strike the centerpiece or bolster and thereby the required spring for the truck is obtained.]

40,945.—Pump.—G. H. Reynolds and G. H. Babcock, Mystic Bridge, Conn.:

First, We claim the two induction valves and the two educting valves of a double-acting pump arranged as shown in the single chamber, A, in combination with the partition, O, between the induction valves, m m' and extending to the eduction valves, n n', substantially as and for the purpose herein described.

Second, We also claim the construction and arrangement of the valve seats, M N, the valves, m m' n n' and the partition, O, whereby the said valves and their seats may be removed from the chamber, A, in one mass, substantially as herein specified.

Third, We also claim the employment of the cam, I, in combination with the hinged bail, F, and the bonnet, E, substantially as and for the purpose herein set forth.

40,946.—Curry-comb.—J. W. Rockwell, Ridgefield, Conn.:

I claim a curry-comb having a series of metal bars, A, applied to a flexible back, B, substantially as and for the purpose set forth.

[This invention consists in a curry-comb having its metallic bars or teeth attached to a flexible back made of leather or other suitable material in such a manner that a light and durable comb is produced, which will readily adapt itself to the sinuosities of the body of a horse or other animal on whom it may be used.]

40,947.—Safe.—Isaiah Rogers, Washington, D. C.:

I claim, first, A burglar-proof safe having the space between its walls provided with balls arranged in such a manner that they may turn and still be retained in proper position, for the purpose herein set forth.

Second, The employment or use of balls of different diameters substantially as and for the purpose specified.

Third, The steel plate, D, secured to the outer face or side of the wall, B, when said plate is used in combination with the balls as and for the purpose set forth.

40,948.—Fastening for Tobacco Presses or Cases.—C. E. Rymes, Charlestown, Mass.:

I claim my improved segment band fastening, as composed of the screw bolt, b, the nut, e, the adjustable washers, c c, their concave seats, d d, and the cam or eccentric, g, they being made, arranged, together and applied to the band substantially in manner and so as to operate as described.

40,949.—Pessary.—H. V. Scattergood, Albany, N. Y.:

I claim the construction of a pessary in the form of a light self-adjustable frame, constructed substantially as described, to be applied externally to the uterus to raise and support the same in the manner set forth in this specification.

40,950.—Apparatus for Washing Ores.—Philip Scheuerman, Hancock, Mich.:

I claim, first, The combination of the shaft, F, cam, E, and yoke, D, with the plunger, c, of an ore washer, substantially as described.

Second, The two separate reservoirs, A A, provided with screens, J J, in connection with a single plunger, C, arranged substantially as shown to admit of the plunger forcing the water simultaneously through both screens for the purpose specified.

Third, The combination of the strip, H, and plates, I I, with the plunger, C, and reservoirs, A A, operating as a guide to the said plunger, and a partition between the reservoirs, all as herein shown and described.

Fourth, The tubes, K, provided with openings, b, in their under sides in close proximity to the screens, and communicating with chambers, L, at the end of the screens opposite to the ends on which the ore or pulp is admitted, substantially as and for the purpose set forth.

[This invention relates to certain improvements in that class of ore-washers in which water is forced up through screens on which the ore or pulp is discharged from the stamp mill. The object of the invention is to obtain an ore-washer of the class specified which will be more compact than those previously devised, more simple in its construction as well as more efficient in its operation.]

40,951.—Machine for making Sheet-metal Eave Troughs.—S. A. Scofield and Erastus Churchill, Morenci, Mich.:

We claim, first, A stationary supporting bed, A, with a stationary circular "former" constructed on one of its edges, so as to stand entirely above the base of the bed, in combination with a recess, a, of the form and located substantially as described.

Second, The combination of the stationary bed, A, circular former, B, and the recess, a, with the vibrating head, C D, substantially as and for the purpose described.

Third, The wedge-shaped clamping piece, D, between the circular former, B, and the shoulder of the head, C, when constructed and arranged substantially in the manner and for the purpose described.

Fourth, So applying a wedge-shaped clamping piece, D, to a head, C, that by manipulating a lever the pressure of the wedge may be maintained and also the vibration of the head produced, substantially as described.

Fifth, The bent arms, d d, in combination with a swinging head-clamp, D, and recessed bed and former, A B a, substantially as and for the purpose described.

40,952.—Bobbin.—C. A. Shaw, Biddeford, Maine:

I claim a bobbin substantially such as described, combining in one and the same article the grooves, o o, bosses, f f, and conical or cone-shaped ends, m m g g, and this I claim whether the said ends are cut out or sunk on their outside faces in the manner described or not.

40,953.—Process of Refining Sorghum Sirup.—J. F. Sheldon, Viola, Ill.:

I claim the process herein described of treating cold sirups with saleratus in the manner described and for the purposes set forth.

40,954.—Process of Manufacturing Sugar from Sorghum.—J. F. Sheldon, Viola, Ill.:

I claim the process herein described of treating sorghum sirup, when cold, with saleratus or its equivalent, in the manner and proportions herein set forth and described.

40,955.—Canceled.

40,956.—Artificial Leg.—I. D. Small, North Fairfield, Ohio:

I claim, first, The combination with the knee and ankle joints, constructed as described of the cords, C and E, spiral spring, D, and pulleys, L and M, arranged, attached and operating as and for the purpose specified.

Second, I claim the spring, S, when constructed, applied and operating as set forth.

40,957.—Railroad Car Truck.—A. F. Smith, Norwich, Conn.:

I claim, first, Suspending the car to the truck by freely swinging links of so short radius that the gravity of the parts alone will effectively sustain the lateral motion at high velocities, substantially as herein set forth.

Second, The employment of the within-described fixed straps, M, swinging suspending links, N, joint, m, and bars, a b, or their respective equivalents arranged substantially as shown, whereby the vertical strain is borne by the top of the bearing beam, A, and base of the swing beam, B, as usual, and a shorter radius of lateral motion secured with the advantage specified.

40,958.—Projectiles for Ordnance.—D. E. Somes, Washington, D. C.:

I claim, first, Restraining a ball or projectile in a gun on its outward passage by means of friction, till the powder shall have time to burn and the maximum or any desired amount of its power developed substantially in the manner described.

Second, A projectile with mortices, d d d d, and pieces, f f f f, springs, n n, and cap, n, made and used substantially as described.

40,959.—Cultivator.—A. J. Sparks, Wyanet, Ill.:

I claim, first, The two levers, G G', connected together by a joint formed of the slotted plate, g, and segment rod, l, and attached to the plow beams, H H, substantially as shown, to admit of a ready lateral movement of the same as well as the ready elevating of the plows above the surface of the earth as set forth.

Second, The suspending of the plow beams, H H, from the frame, A, by means of the upright bars, J J, and incline bars, p p, provided with rollers, s o, at their upper ends which work on suitable ways or guides, substantially as set forth.

Third, The hooks, M, on the plow beams, H, in connection with the pendant hook projections, N, on the frame, A, when said parts are used in combination with laterally moving plow beams for the purpose specified.

[The object of this invention is to obtain a plow of simple construction which will admit of the plows being moved laterally with greater facility than usual, to conform to the sinuosities of the rows of corn and also admit of the driver either riding on the machine or walking behind it as he may desire; provision being also made for gaging the depth of the penetration of the plows and regulating the space between them to suit the width of the space between the rows of corn.]

40,960.—Hoop Skirt Wire.—J. W. Stiles, New York City:

I claim a steel hoop for ladies' hoop skirts, covered with one or more metals by plating, electro-plating, or in the moist way or other equivalent means, the hoop may then or may not be covered with cotton or other textile fabric, whereby I produce a more elegant, cleanly and cleansable hoop for ladies' hoop skirts.

40,961.—Field Rollers.—U. M. Sunderland, Highgate, Vt.:

I claim the gudgeon cross-bar, P, when provided with the single attaching flanches, p p, projecting in opposite directions in combination with the shouldered gudgeons, M M, and box enlargement, L L, extending over them in the manner and for the purpose herein set forth.

40,962.—Machine for Measuring Cloth.—C. M. Swany, Philapelphia, Pa.:

I claim the drum, B, provided with the screw shaft, C, and nut, D, in combination with the graduated plates, b b, one or both, pressure roller, E, and the lever or pawl, J, and ratchet or milled wheel, I, or their equivalents, all arranged to operate substantially as and for the purpose herein set forth.

[This invention consists in the employment or use of a drum provided with a screw shaft and nut, and also with a ratchet, in connection with a pressure roller, lever and graduated plate, all being arranged in such a manner and in such relation with two drums or shafts from one of which the cloth is unwound and upon the other of which it is wound, that the desired work may be done in an expeditious and accurate manner.]

40,963.—Spring for Furniture.—C. F. and J. W. Tillman, La Crosse, Wis.:

I claim the stem, D, provided with an adjustable pin, h, in combination with the cap, C, buttons, d, spring A, and slat, B, all constructed and operating in the manner and for the purpose herein shown and described.

[The object of this invention is to secure spiral springs and particularly bed springs in an upright position, doing away with the process of tieing or sewing to the webbing and to render said springs adjustable, so that they can be set according to the weight which they are to sustain and to prevent them being bent sideways.]

40,964.—Process of Bronzing or Coloring Iron.—Hiram Tucker, Newtown, Mass.:

I claim the process of bronzing iron substantially as described.

40,965.—Mode of Changing Motion.—R. G. Turner and H. Stone, Dedham, Mass.:

We claim the above-described combination for obtaining a continuous rotary from a reciprocating rectilinear movement, the same consisting of the rack, K, the two engaging gears, D E, the rack gears, H I, and the cams, F G, and spring catches, L M, or their mechanical equivalents, arranged and applied to two shafts, A B, substantially in manner and so as to co-operate as hereinbefore specified.

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40,966.—Car Coupling.—John Van Dyne, Crum Elbow, N. Y.:

I claim the arrangement of the cam, F, jaws, B, and springs, C, with the guides, D D, head, A, and shackle, E, in the manner herein shown and described.

[The object of this invention is to simplify the car coupling by dispensing with certain parts thereof, and at the same time render the coupling more efficient than it originally was.]

40,967.—Tool for Fastening Boiler Tubes.—Aaron Van Guysling, North Greenbush, N. Y.:

I claim, first, The application of the handle, F, to the sleeve, A, to operate in combination with the segmental expanders, D, and conical mandrel, C, in the manner and for the purpose substantially as described.

Second, So arranging the segmental expanders, D, in relation to each other and to the sleeve, A, that the same when not expanded leave no gaps between their adjoining edges, and when expanded they embrace the largest possible part of the inner surface of the tube as set forth.

This invention is intended as an improvement on a tool for attaching tubes to boilers, on which a patent was granted to Thomas Prosser, April 17, 1849. The improvement relates to the slotted sleeve which forms the guide for the segmental expanders, and which is provided with a handle so that after the conical mandrel has been inserted, the tool can be turned, and that by this action the joints between the tools and tube-shut is rendered smooth, free from ridges or wrinkles and perfectly tight.]

40,968.—Confining the ends of Elliptic Springs.—Richard Vose, New York City:

I claim the combination of curved, tension-spring plates, with elastic bearing plates, in the construction of a tension elliptic spring, when said tension plates are self-retained in their proper positions, and left free to expand independently of each other, substantially as is herein set forth and described.

I claim also the use of hollow end caps to retain and secure the ends of the elastic plates, in an elliptical or semi-elliptical tension plate spring, substantially in the manner and for the purpose herein set forth.

40,969.—Shingle Machine.—Martin Weaver, Millersburgh, Pa. Ante-dated Dec. 1, 1863:

I claim, first, The combination of the horizontal circular saw, C, adapted to cut on both sides of the horizontal endless chain, E, and gage blocks, K, all arranged and operating as herein set forth.

Second, The combination of the tables, N N′, with the rollers, M M′, endless chain, F, gage blocks, K K′, and double-acting saw, C, all constructed and operating as described.

[By means of this invention shingles are sawn at two places on a shingle machine as fast as two operators can place the blocks in position.]

40,970.—Portable Photographic Gallery.—Samuel Weaver, Gettysburgh, Pa.:

I claim the enlargement of a portable daguerrean gallery or house, by means of the elongated sliding bars, C, friction roller boxes, D, movable sides, g, and friction rollers, E, as arranged, and operating substantially in the manner herein specified.

40,971.—Vegetable Cutter.—Amos H. Wellington, Woodstock, Vt.:

I claim my improved machine or combination and arrangement of the vertical conical hopper, B, the two detainers or cutting boards, L L, and a vertical hollow cone or frustum, C, provided with knives, having throats opening into the interior space or chamber of the said cone or frustum, the whole being substantially as and for the purpose and to operate as hereinbefore specified.

40,972.—Shuttle Fastening.—Gilbert D. Whitmore, Boston, Mass.:

I claim the above-explained improved blind fastener, having a handle, E, and two or any other suitable number of inclined cam slots, e e, made and applied together and arranged with respect to a spring-bolt, A, and its case, B, substantially in manner and so as to operate therewith and with catches, F H, disposed as specified.

40,973.—Cultivator.—Erastus Wilcox, Delhi, Iowa:

I claim the combination and arrangement of the frame, A A B B, bars, D D, and adjustable standards, F F, wheels, H H, inclined bars, I I and J J, stands, N N and T T, bars, L and M, handles, J′ J′, shovel stocks, Q and V, with cultivating shovels, S and X, the whole constructed as described.

40,974.—Fan Blower.—William Winter, Plainfield, N. J.:

I claim the annular air-chamber, d, and double conical cavity, a, with central apertures, f, in combination with triangular rotary wings, B, constructed and operating substantially as and for the purpose shown and described.

40,975.—Cast-iron Building Pieces.—Robert Wood, Philadelphia, Pa.:

I claim building pieces consisting of hollow cast-iron shells, having projections and holes arranged substantially as and for the purpose herein set forth.

40,976.—Refrigerator.—W. M. Baker (assignor to himself and W. R. Heath), Walpole, Ind.:

I claim the air-tubes, I J, and air-chamber, H, in combination with the ice-chamber, D, and ventilator, K, all being arranged in relation with the inner case, B, to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to an improvement on a refrigerator for which Letters Patent were granted to this inventor, bearing date July 18, 1863. The object of the invention is to supply the interior of the refrigerator with cold dry air and to carry off from the former all gaseous impurities.]

40,977.—Cooling and Discharging Fermented Liquors.—Felix Brunnow (assignor to himself and Joseph N. Naglee), Philadelphia, Pa.:

I claim a vessel, A, of any suitable form for containing ice and water, and the weighted inverted vessel, D, in combination with the cocks and tubes herein described, or any equivalent to the same, the whole operating substantially as described, for the purpose specified.

40,978.—Primed Metallic Cartridge.—Silas Crispin, New York City, assignor to Thomas Poultney, Baltimore, Md.:

I claim, first, The combination of a thin-wrapped metal and paper cartridge case with a primer, so securely fastened together as to form a primed expanding wrapped metal and paper cartridge, substantially as above described.

Second, The combination of a thin-wrapped metal cartridge case and a primer, so securely fastened together as to constitute a primed expanding wrapped metal cartridge, substantially as described.

40,979.—Corn Harvester.—Edward J. Eno (assignor to Stephen H. Eno), Jacksonville, Ill.:

I claim, first, The rising and falling plates, I I′, operated by the part pinion, J J′, in combination with the guide arms, e, and the endless apron, Q, all being placed within or attached to a box, C, applied to the body of a cart or wagon, to operate substantially as and for the purpose herein set forth.

Second, The particular manner of attaching the box, C, to the wagon body, to wit, by means of the posts, D, and keys, E, as herein set forth.

[This invention relates to a new and improved machine for detaching the ears of corn from the standing stalks, and depositing the former in a cart or wagon as the latter is drawn along over the field and in proper relation with the rows of corn.]

40,980.—Spindle Bolsters of Spinning Machines.—Richard Fethney, Manchester, England, assignor to Lewis Leigh, Seymour, Conn. Patented in England Nov. 5, 1861:

I claim, first, The tubular bolster for spindles, herein described, provided with a spherical bearing fitting a recess in the spindle rail, for the purposes and substantially as specified.

Second, I claim the means, substantially as described, for preventing the rotation of said bolster and retaining it in its recess in the spindle rail as set forth.

40,981.—LeverJack.—Thomas M. Kane (assignor to himself and Ogden Howell), Goshen, N. Y.:

I claim the construction of the uprights, in combination with the lever block and clevis, when constructed, arranged and combined as herein described and for the purposes set forth.

40,982.—Fan Blower.—M. V. Noble, St. Anthony, Minn., assignor to himself, J. C. Nobles and Eliza C. Suydam:

I claim, in combination with a fan case having closed eyes, and a divided fan, the double sets of inlet and exit air ducts or passages, C C′ and D D, constructed, arranged and operating together for the purpose of drawing in and forcing through it counter currents of pure and impure air, substantially as and for the purpose described.

40,983.—Mode of Fastening Bales of Merchandize.—T. W. Reilly (assignor to Hector H. McClean), New Orleans, La.:

I claim the buckle, A, with tongues, d d, and center piece, C, as fully represented in the drawings.

40,984.—Manufacture of Artificial Stone.—F. M. Ruschaupt, New York City, assignor to J. G. Kershaw, Philadelphia, Pa.:

I claim the manufacture of artificial stone from lime, clay and gelatinous silicic acid, mixed and pressed substantially as set forth, for the purpose specified.

40,985.—Hoop Skirt.—S. S. Sherwood, Acquackanonck, N. J., assignor to himself and Alexander Douglas, English Neighborhood, N. J.:

I claim the combination with the tapes, A A, woven with loops or their equivalents, and the hoops, E E, of the cords or braids, F F, when the latter are secured outside of the tapes, and not through them, substantially as and for the purposes set forth.

40,986.—Turbine Water Wheels.—Seth Whalen, Balston Spa, N. Y., assignor to himself and Hannah Whalen, Burnt Hills, N. Y.:

I claim the guide wheel, g, with the chutes, l, l, and central discharge wheel, k, with the buckets, 2, 2, substantially as specified, in combination with the stop water or cap, l, extending from the guide wheel, g, to the shaft, h, as and for the purposes specified.

I also claim the follower blocks, n, and keys or wedges, 5, in combination with the stop water or cap, l, for the purposes and as specified.

40,987.—Mill for Grinding Fruit, Grain, &c.—Wm. N. Whiteley, Jerome Fassler and O. S. Kelly, Springfield, Ohio:

First, We claim the three grinding rollers in combination with the metal segments, k k, constructed substantially as described for the purposes set forth.

Second, In combination with the frame and grinding rollers arranged substantially as described, we claim arranging the gearing which communicates motion to or between the rollers on the ends of the shafts outside of the journal boxes and frame, substantially as described.

Third, We claim, in combination with the ribbed segment, N, the spiral, crushing and feeding roller arranged over the grinding rollers, H and H′, substantially as described and shown, to crush and feed the apples uniformly to the grinding rollers.

Fourth, We claim two spiral-ribbed grinding rollers running together at different velocities, with the ribs of one roller crossing the ribs on the other at an angle where the grinding is effected, in combination with the crushing and feeding roller arranged above them.

Fifth, We claim the combination of the hopper, Q, ribbed segment, N, segments, R R′, and rides, L L, with the roller, M, forming the crushing box, constructed so as to be readily removed, as described, for washing and cleaning the mill.

40,988.—Metallic Cartridge.—T. J. Rodman, Watertown, Mass., and Silas Crispin, New York City, assignors to Thomas Poultney, Baltimore, Md.:

We claim, first, The thin metal-wrapped cartridge case, made substantially in the manner described and for the purpose set forth.

Second, The forming of a wrapped thin metal cartridge case combined with an internal or external strengthening disk or cups, whether this disk or cup is made of paper, metal, or an elastic material, substantially as above described.

RE-ISSUES.

1,589.—Loom.—Thomas Lovelidge, Philadelphia, Pa. Patented Feb. 14, 1860:

I claim yarn-delivering mechanism, consisting of a toothed wheel and a detent or escapement lever, or their equivalents, applied to or operating with the yarn beam, substantially as set forth, when the said mechanism is controlled by the tension of the yarn through the medium of the devices herein set forth, or the equivalent to the same.

1,590.—Preparation of Straw for Paper Pulp.—J. B. Palser and Gardner Howland, Fort Edward, N. Y. Patented June 21, 1859. Re-issued July 3, 1860:

I claim the process of subjecting straw or similar stalks to the simultaneous action of an alkaline liquid, agitation, and a high temperature, such as is produced by contact with a surface heated by a fire heat, whereby such a change is effected in the organization of the glutinous or resinous matters contained in the material that the fibrous material can be separated from them by washing.

1,591.—J. B. Palser and Gardner Howland, Fort Edward N. Y. Patented March 20, 1860:

We claim as a new article of manufacture the staple fiber made substantially as herein set forth.

1,592.—Sewing Machine.—William Stanley (assignee by mesne assignments of A. H. Hook), New York City. Patented Nov. 30, 1859:

I claim the combination of the levers, m n, arm, k, spring, o, and cam, p, constructed and arranged substantially as and for the purpose set forth.

The combination of the two washers or plates, z z, concave at the center and rounded at their outer edges, with a center pin, and any suitable means to give such plates pressure, substantially as and for the purposes set forth.

DESIGNS.

1,876.—Metal Tea Set.—Ernest Kaufman, Philadelphia, Pa.

1,877 and 1,878.—Stove Plates.—D. E. Paris, Troy, N.Y.

EXTENSIONS.

Machinery for Making Cord.—W. E. Nichols, East Haddam, Conn. Patented Dec. 11, 1849. Re-issued Jan. 20, 1857:

I claim, first, Twisting or controlling the twist of the strands while the main frame is revolving to lay them into cord, by causing an even-faced wheel attached concentrically to and revolving with the bobbin frame, to travel over a fixed and smooth surface, friction causing the frame to revolve.

Second, Revolving the bobbin frames on their own axes to twist the strands, at the same time that they are carried round a common center to twist the cord by rolling them on the surface of a stationary annular inclined track toward the inner or outer periphery of which they can be adjusted to run, so as to vary the relative twist of the strands and cord, substantially as herein set forth.

Third, I claim the construction and arrangement of the central stem or spindle of the bobbin frame, operating substantially as herein set forth; whereby the yarns are collectively subjected to progressively increasing tension and twist, from the commencement to the end of the process of laying them into the strand, whereby the latter is rendered smooth and regular in its figure and of uniform density and strength, and subjected to uniform tension, while being laid into the cord.

Loom for Weaving Figured Fabrics.—Moses Marshall, Lowell, Mass. Patented Dec. 11, 1849. Re-issued April 24, 1860:

I claim combining with the jacks that operate the series of leaves of heddles, and with the lifter and depresser and pattern chain, or any equivalent apparatus for determining the pattern, a mechanism for holding the jacks either in their elevated or depressed position, when not required to be operated, substantially as and for the purpose specified.

I also claim imparting an irregular motion, substantially such as herein described, to the jacks, by means of eccentric cog wheels, substantially as and for the purpose specified.

Notes and Queries

O. M. B., of Conn.—By covering the surface of your galvanizing vessel with powdered charcoal, lampblack or soot, you not be troubled with disagreeable fumes.

O. E. M., of Ill.—We have never seen a casting (part of which was chilled) rendered malleable, with the chilled part preserved in the original condition.

T. C., of R. I.—You state that an article recently patented in England has been introduced and sold here, and you ask—"if I obtain an assignment from the patentee and take out a patent here, can I prevent the further manufacture of the article by other parties?" We reply you can; but the inventor must make the application for the patent in his own name and assign the whole right to you, in which case the patent would issue to you as assignee.

T. G. S., of C. W.—We have no business information concerning House's mode of operating window blinds. Unless you get the facts from him we do not know in what other way you can do so.

L. D. G. of N. J.—Address J. C. Hoadley & Co., Lawrence, Mass., for a small engine for farm purposes. We are glad to see that you are so sensible as to contemplate using steam on your farm instead of depending on hand labor. English farmers are derided sometimes for their old fogy ideas, but they are about twenty-five years ahead of their brethren in our country in this respect. Knitting machines are in practical operation, and there are many that come within the range of ordinary family use. The wind dial and register is about a century old, if not more.

C. E. F., of N. Y.—Your method of expressing cider appears to be new, and we do not see any reason why the plan would not work well, though there may be practical difficulties which could only be found out by experiment.

R. S. S. H., of Md.—The *New England Farmer* is published in Boston. You had better send on $2 and subscribe for it, and we have no doubt the editor will answer your enquiry.

A. C. E., of Mass.—You ask if there would be much risk in your going to Buffalo "to get a situation as second engineer on a propeller." You are just as competent to answer such a question as we are. We know nothing whatever about situations on Buffalo propellers.

H. H., of Ohio.—If an invention has been in use in your town for five years a valid patent could not be obtained for it—you can continue the use of the invention without danger of molestation. We thank you for your efforts to increase the circulation of our paper in your neighborhood.

G. W. F., of Ohio.—We cannot tell you how to split stones by chemical means so as to be of any practical value.

H. W. F., of C. W.—Clean your coins with dilute sulphuric acid; one part of acid in ten of water will answer very well. If there are dates upon them this will bring them out, if not, not. Nothing can bring out the date of coin which has been worn off; there are some old coin washers in this city, we are told, who have a simple method for bringing out dates—that is to manufacture 'em.

J. L. H., of Mich.—"Campin's Practical Mechanics," contains a portion of the information you seek. We cannot see how it is that correspondents write to us for information upon matters that we have just printed whole columns about in the SCIENTIFIC AMERICAN. A little more attention would save trouble on all sides.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Dec. 16, to Wednesday, Dec. 23, 1864:—

J. O. H., of Pa., $44; B. E., of N. Y., $25; J. M., of N. Y., $25; L. S., of N. Y., $41; H. H. E., of Conn., $16; L. O. C., of Pa., $20; W. H. B., of Cal., $20; E. C., of N. Y., $40; W. F. O., of Mass., $45; O. & F., of Mass., $20; R. T., of N. Y., $20; G. B., of N. J., $16; J. E., of N. Y., $16; R. H., of Mass., $20; G. G. H., of Conn., $45; C. C. C., of N. Y., $45; J. E., of N. Y., $100; F. McC., of Conn., $50; V. H. H., of N. Y., $12; S. L., of Ohio, $16; D. & K., of Cal., $30; G. B. McD., of Ky., $16; G. R. V., of N. Y., $30; H. C., of Ohio, $47; H. W. B., of Iowa, $16; E. M. K., of Iowa, $16; J. T., of Ind., $16; A. & H., of Conn., $30; T. A. M., of Pa., $16; C. W., of Mich., $25; A. J. M., of N Y., $32; J. B. H., of R. I., $100; W. H., of N. Y., $12; W. L., of N. Y $48; W. M. K., of N. Y., $41; J. B., Jr., of N. Y., $20; H. S. B., of La. $15; R. S. C., of Iowa., $45; W. M. D., of N. Y., $41; B. A. H., Iowa, $45; E. C. C., of Ill., $41; T. R. C., of Mass., $45; G. S. P., of Mass., $20; W. H., of N. Y., $22; N. C. W., of N. Y., $25; H. H. H of Ohio, $16; D. L., of Vt. $20; C. T., of N. J., $16; M. B., of Ky., $26; J. W. P., of Mass., $35; J. Z., of Ill., $15; H. S. S., of Mass., $16; A. L. S., of Conn., $25; G. T. B., of Mass. $16; R. G., of Mass., $20; G. S., of Maine, $16; T. J. B., of Wis., $16; A. A., of Ill., $16; N. J. A., of Ill., $16; P. B., of N. J., $25; G. C., of Conn., $16; S. D. T., of Mass., $16; M. H. M., of Ohio, $16; F. C., of Mass., $35; A. S., of N. Y., $20; F. B., of Bavaria, $16; J. T. L., of N. Y., $12; J. D., of N. Y., $20; P. S. F., of N. Y., $45; J. C., of N. J., $20; S. B., of N. Y., $20; M. F., of Conn., $20; H. & H., of N. Y., $25; P. C., of N. Y., $96; W. F., of Mo. $20; L. C., of Russia, $16; E. & H., of Mass., $20; W. X. S., of Mass., $20; E. W., of N. Y., $16; G. O. W., of Mass., $25; B. & G., of Conn $25; J. P. B., of Ill., $50; A.G. W., of Cal., $30; J. W. D., of Mich., $15; T. & S., of Wis., $16; G. H. S., of Conn., $16; S. D. D., of Iowa, $16; S. & S., of Ill., $15; T. S. M., of Ohio, $16; T. J. T., of Md., $16; G. H. E., of Mass., $15; N. H. R., of N. J., $16; J. S., of Mo., $16; W. H., of Pa., $16.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have

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not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Dec. 16, to Wednesday Dec. 23, 1864 :—

J. O. H., of Pa. (2 cases); A. S., of N. Y.; A. C., of N. Y.; W. M. D., of N. Y.; V. H. H., of N. Y.; C. H. H., of N. Y.; J. P. B., of Ill. (2 cases; M. B., of Ky.; P. B., of N. J.; B. E., of N. Y.; W. M. K., of N. Y.; E. C. C., of Ill.; J. W. P., of Mass.; D. & K., of Cal.; A. L. S., of Conn.; D. E. H., of Mass.; A. & H., of Conn., A. B. G., of N. Y.; F. C., of Mass.; W. H., of N. Y.; W. L., of N. Y.; L. S., of N. Y.; A. A. B., of N. Y.; B. & G., of Conn.; G. O. W., of Mass.; F. McC., of Conn.; D. E. H., of Mass.; G. R., of Ky.; C. W., of Mich.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

BISULPHIDE OF CARBON, CHEMICALLY PURE, for sale in quantities from one to fifty carboys. Address DUBOIS D. PARMELEE, Chemist, 22 East 41st street, New York. 1 13*

PATENT NIPPERS AND CLINCHER.—THE SUBSCRIBER wishes to dispose of his whole right and title to his patent nippers and clincher, which was illustrated in No. 26, Vol. IX., of the "Scientific American." State, county, shop, or the entire right for sale cheap. Address E. WARREN, Marshall, Mich. 1 2

OVERMAN'S MANUFACTURE OF IRON.—OF THIS valuable book there now remains but a few copies. The Manufacture of Iron in all its various branches. Including a description of Wood Cutting, Coal Digging, and the Burning of Charcoal and Coke, the Digging and Roasting of Iron Ore, the Building and Management of Blast Furnaces, Working by Charcoal, Coke or Anthracite, the Refining of Iron, and the Conversion of the Crude into Wrought Iron by Charcoal Forges and Puddling Furnaces; also a description of Forge Hammers, Rolling Mills, Blast Machines, Hot Blast, &c. To which is added an Essay on the Manufacture of Steel, by Frederick Overman. In one volume 8vo., 492 pages, illustrated by 150 wood engravings. Price $6, by mail free of postage.

CONTENTS.—Iron Ore, Fuel, Reviving of Iron, Manufacture of Wrought Iron, Forging and Rolling, Hot Blast, Waste Heat and Gas, Fire Brick and Refractory Stones, Motive Power, Manufacture of Steel, Appendix.

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FOR SALE.—AN UNPATENTED IMPROVEMENT ON modes of fastening chimneys on lamps. Address N. PORTER, Youngstown, N. Y. 1*

PLATINA SHEET, WIRE, &C.—FOR ALL PURposes. Imported by SUTTON & RAYNOR, 748 Broadway, New York. 1 4eo*

FIRE ENGINE FOR SALE VERY CHEAP, SUITABLE for country, town or village, will throw a stream 180 feet. ALBERT POTTS, north-east corner of Third and Willow streets, Philadelphia, Pa. 1 4*

FOR SALE CHEAP.—THIRTEEN PERFECT VOLUMES of the SCIENTIFIC AMERICAN, commencing in 1849, the three first volumes bound, the other ten not bound. Address GEO. B. WELLMAN, Cooperstown, Otsego county, N. Y. 1 2*

SEALING OR COVERING HAMS.—THE UNDERSIGNED having received a patent for a new and improved method of sealing or covering hams, wishes to make it available to packers and curers, either by contract or sale of right. The advantages of this covering are noticed in No. 26, Vol. IX., of the "Scientific American;" samples can be seen at the Packing Houses of J. A. Amelung & Son, New York, and at Leland & Mixer's, Chicago, Ill., to whom application can be made. H. A. AMELUNG, 532 Washington street, New York. 1 2*

DREAMS—THEIR SIGNIFICANCE, SPACE AND Time Annihilated, Poetry and Music in Sleep, Horrid Dreams and Happy Dreams—Are Dreams Prophetic? Read Psychology; or The Science of the Soul, in Jan. Double No. "Phrenological Journal. Only 15c.; or $1 50 a year. Address FOWLER & WELLS, 308 Broadway, New York. 1 2

BAIRD'S NEW CATALOGUE OF PRACTICAL AND SCIENTIFIC BOOKS is now ready, and will be sent free of postage to any address. Every reader of the "Scientific American" is particularly invited to send for one. It will be found of interest and importance to all practical men. HENRY CAREY BAIRD, Industrial publisher, 406 Walnut street, Philadelphia.

THE NEW PATENTS.

No. 265 BROADWAY, NEW YORK.

TO THE PUBLIC.—PERMIT US TO CALL YOUR attention to important improvements in Fire and Burglar Proof Safes, recently patented by Walter K. Marvin, of our firm, and bearing the following dates:

First Patent, for improvement in filling for safes, Dec. 1st, 1863.

Second Patent, for securing durability of both the lining and iron works of Safes, Dec. 1st, 1863.

The knowledge gained from over 20 years' experience as manufacturers and sellers of the two popular Safes, known as the "Plaster or Wilder Patent" and the "Alum Patent," enables us to construct a Safe possessing the good qualities of each of these, while defects have been remedied which experience has proven to belong to both of them. The explanation is simple. We take "dry" calcined Plaster of Paris and Alum (the latter being broken into small lumps), and thoroughly mix them.

We pack this mixture between the inner and outer cases, where it remains unchanged any number of years, until fire melts the alum (which contains a large quantity of water), and thus saturates the plaster, and forms the steam, which always preserves the contents of the safe. The plaster, by being wet, sets firmly and even; if the alum near the outside is entirely melted it forms cells which retain the precise shape of the lumps of alum, and even the filling of plaster keeps the safe as well filled as before the fire. This constitutes the first patent.

The second patent consists in coating the sides of the cases exposed to the filling with liquid quartz or glass, making a complete enamel, and thus rendering the joints hermetically tight.

Our safes, therefore, possess the following advantages:

They combine the two most fireproof substances known.

They are perfectly dry, and do not corrode the iron.

They do not lose their fireproof qualities by age.

Our Locks are superior to any others in use.

When it is remembered that nearly all the safes now in use are filled with plaster and water, or with alum and clay, the value of our improvement in obtaining perfect security from fire, non-liability to shrinkage of filling, so troublesome and dangerous in other modes, will be recognized.

We would call special attention to our "Steel Burglar-Proof Bank Safes and Specie Chests." As they are made of three, or five, or more thicknesses, as may be desired, and the steel is hardened beyond the temper of any drill, and the rivets are so arranged that they do not go through more than two plates, and consequently can not be punched in, we know that we can produce a safe that is impenetrable to any burglar, however skilled. We make these of all sizes, from $100 upwards, and they can be securely fastened in any of our Fireproofs.

We submit, from some of the highest authorities in the United States, the following testimony:

U. S. Assay Office, New York, Dec. 10th, 1863.

"Walter K. Marvin, Esq.:—Dear Sir:—I have submitted to careful experiment the combination of materials lately patented by you as a non-conducting filling for Fireproof Safes, and I find them admirably adapted to resist the action of fire, the proof of which I placed in your hands this day. Having long given much study to the improvement of Fire Safes, I can confidently say that I consider your new composition superior to all others of the kind that have come under my notice. Respectfully yours, JOHN TORREY."

"I have tested your Fireproof filling thoroughly, and am satisfied that no other in use is equal to it.

ALEXANDER H. EVERETT,
Analytical and Consulting Chemist.
New York College of Pharmacy, Dec. 4th, 1863."

"I regard your improved lining as superior to either the old plaster and water, or alum and clay filling.

DUBOIS D. PARMELEE, M. D.,
Practical and Analytical Chemist.
22 East 41st street, New York, Dec. 1st, 1863."

"Having been long acquainted with the materials used and modes of filling Safes, I am prepared to express a highly favorable opinion of your invention, as fulfilling the required conditions, mechanically and chemically, and no mixture of superior qualities is known to me.

A. A. HAYES, M. D., State Assayer.
16 Boylston street, Boston, Dec. 7th, 1863."

"And I consider yours the best combination of materials for fire proof filling with which I am acquainted.

CHAS. A. SEELY, Consulting and Analytical Chemist.
244 Canal street, New York, Dec. 2, 1863."

We pledge ourselves to convince any one of the above facts who may favor us with a call. For more full information with regard to our Safes, please send for larger Circular.

MARVIN & CO.,
Sole Manufacturers of Marvin's Patent Fire, Burglar and Damp Proof Safes, 265 Broadway, New York. 1

FOUNDERY AND PLOUGH MANUFACTORY FOR sale at Warrenville, Warren county, N. J., and for the following reasons is valuable—being located in a healthy and rich agricultural district, and near railroad and canal; long established and doing a large business and perfectly safe and profitable. The fixtures and machinery complete and in first-rate order. Lot containing five acres and in a high state of cultivation, on which is a commodious dwelling, nearly new, a new barn 58 by 26 feet, foundery 63 by 40 and other out-buildings; fruit, water, &c. Stock and fixtures consist of plow and other castings, plows and other agricultural implements (no old or unsaleable stock on hand), a good steam engine and boiler (boiler new), patterns, flasks, saws, &c. All will be sold together or the lot with the one half interest in stock and fixtures on liberal terms. An active party, with some means and credit can be placed at once in a good position and without risk. Address Wm. F. WIRE, Belvidere, N. J. 1 1*

PATENT CALIPERS.—THE SELF-ADJUSTING CALipers illustrated in the "Scientific American" of Aug. 8, 1863 (see engraving in that number) are manufactured by the patentees at Worcester, Mass., and are now ready for delivery. Samples sent (post-paid) by mail, on receipt of 75 cents in currency; usual discount made to the trade. Agents liberally dealt with. Address KIMBALL & TALBOT, Worcester, Mass. 1 4*

NATIONAL OFFICE FOR THE SALE OF PATENT Rights, L. C. Hootee & Co., 229 Broadway (Room 26), New York City. The only prominent organization of the kind in the United States, affording the greatest facilities through advertisements and local and traveling agencies. All patentees, therefore, desiring to dispose of their inventions speedily are invited to call upon or address us. Reliable agents wanted everywhere. Enclose stamp for return postage and circular. Refer to Hon. Eli Thayer, New York, Hon. Peter G. Washington, New York, Hon. Horatio King, Washington City. 1 1*

BEWARE OF THE NORTH-EASTER.—BROWNE'S metallic weather strips and window bands totally exclude wind, rain, snow, and dust from the crevices of doors and windows without interfering with the free use of the same for ventilating purposes. They save one-half the fuel, stop the rattling of the sashes, and are deadeners of sound from the street or otherwise. For circular, with references to thousands of our most respectable citizens, address THE PATENT METALLIC WEATHER STRIP CO., No. 644 Broadway, Corner of Bleecker street, over the Manhattan Savings Bank. 1 4*

A PRETTY PRESENT—SEND TO YOUR NEAREST, dearest and most valued friend, the "Illustrated Phrenological Journal," for 1864. It would be highly prized, and cost only $1 50. FOWLER & WELLS, New York. 1 2

LICENCES TO MANUFACTURE.—ARRANGEMENTS will be made with machinists to sell and manufacture Reid's Patent Quadruple Action Pump, Blower, Exhaustion or Steam Engine. A pump ten inches diameter and ten inches long, keeps a three inch pipe running full, raised two feet, by one man power, at the rate of 200 gallons per minute. Address J. WYATT REID, the Patentee, 24 Old Slip, New York. 1 1*

A BEAUTIFUL, USEFUL AND PERPETUAL PRESENT. The "Phrenological Journal and Life Illustrated," for 1864. Published the first of each month, at $1 50 a year. This year's Vol. contained more than 300 illustrations, and is one of the most entertaining works now published. Order it a year for your nearest, dearest and most valued friend. Sent regularly, to any address, by FOWLER & WELLS, No. 308 Broadway, New York. 1 2

"TIP TOP."—THE JAN. PICTORIAL DOUBLE Number "Phrenological Journal" is the best ever issued. It has forty Portraits and other engravings, including Maj.-Gen. Banks, Lord Lyndhurst and many beautiful women. Only 15 c; or $1 50 a year. New Vol. 1 2

DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., Dec. 15, 1863.

To the Growers and Manufacturers of Flax and Hemp:

THE COMMISSIONERS APPOINTED BY THIS DEpartment, consisting of Hon. J. K. Morehead, of Pennsylvania, William M. Bailey, of Rhode Island, and John A Warder, of Ohio, to consider the following appropriation made by the last Congress, viz.:

"For investigations to test the practicability of cultivating and preparing flax and hemp as a substitute for cotton, twenty thousand dollars."

Having met, and after several days' investigation, believing that a further and fuller notice of their investigations might produce valuable results, adjourned to meet again on Wednesday the 24th day of February next, at 12 o'clock, M.

They request all interested in the distribution of this appropriation, or anxious to develop the subject for the public good, to send to this Department, on or before that day, samples of the hemp and flax in the different stages of preparation; of the fibers and fabrics prepared by them, accompanied by statements of the various processes used, and the cost of production in each case; also, descriptions of the kind and cost of machinery used, where made, &c., together with any and all information that may be useful to the Commission.

This information is necessary before an intelligent distribution of the appropriation can be made. ISAAC NEWTON.
1 9 Commissioner.

UNITED STATES MILITARY RAILROAD OFFICE, No. 250 G street, Washington, D. C., December 19, 1863.

LOCOMOTIVE ENGINES AND RAILROAD IRON FOR SALE

I will sell at public auction, at the Orange and Alexandria Railroad Depot, in Alexandria, Va., on WEDNESDAY, the 13th day of January next:

Ten second-hand Locomotive Engines, 4 feet 8½ inches gage.
About 1,000 tons of old Rails, T and U pattern.
About 300 tons of old Car Wheels.
About 200 tons of Car Axles.
About 200 tons of Wrought Scrap Iron.
About 200 tons of Cast.
A lot of Steel Springs, Sheet Iron, &c.
Sale to commence at 10 A. M.
Terms Cash in Government Funds.

H. L. ROBINSON,
1 3 Captain and A. Q. M.

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Improved Lubricator.

Thorough lubrication of the valves and pistons of steam engines is acknowledged as a necessity by most engineers. For the accomplishment of that object various devices have been employed, viz : the simple cup with a single cock below it ; the globe with two and sometimes three cocks ; the pump to force the oil into the cylinder, and others more or less complicated in construction and operation called " self-feeding," &c. The merits and demerits of these various devices are well known by those who employ them. Without disparaging any, it is confidently believed that the following engraving and description illustrates a lubricator that will prove equal if not superior to all predecessors.

It is simple and scientific in construction and arrangement, easily worked and instantaneous in its operation, and belongs to the class of lubricators which works with the same facility under high steam pressure that it would under atmospheric pressure alone. A is the open basin at the top in which the oil is first placed ; the bottom of said basin has two apertures, *a a*, on opposite sides from the letter *f*, where a tube, *a*2, rises to the top of the basin. B is a disk valve seated beneath the said basin, A, and perforated to correspond with the apertures, *a a'*. C is a stem which rises through the basin, A, sufficiently to receive the lever, D, for the purpose of rotating the valve ; E is the internal reservoir, the bottom of which has also two apertures, *c c'*, which constitute the seat of the valve, F ; F is a disk valve seated at the bottom of the said reservoir, and having apertures, *f f'*, at opposite sides, corresponding with the apertures, *c c*, from the letter *f'*, where a tube rises to nearly the top of the said reservoir. G is a stem of the valve, F, which connects it with B, the top of which is flattened to fit into a recess of similar shape in the bottom of B, by means of which both valves revolve simultaneously; *f*2 is a bent tube fitted to the bottom of the reservoir, to conduct the oil from the said reservoir to the cylinder below ; K is a small rod that passes through (or nearly so) the stem of the valve, B ; *g* is a screw pressing upon K, which, resting upon G, presses the valve, F, firmly to its seat, while the valve, B, is raised, and kept firmly to its seat also. J is a strong spiral spring, compressed so as to exactly fill the space on the stem, G, between the valves, F and B. H is the neck by which the apparatus is secured to the steam cylinder ; *h*, *h*1, *h*2, *h*3, are notches on the top of the rim of the basin ; S is a catch on the lever, D, which keeps the said lever in the desired position.

The operation is as follows :—The receiving basin, A, being filled with oil, the lever, D, is moved till it reaches the position indicated by the dotted lines in Fig. 2 ; the oil will flow down through the aperture, *a*, into the reservoir, E ; the air or steam escaping from the latter through the tube, *a*2, without interfering with the descending oil. When it is desired to introduce the oil into the steam cylinder, the lever, D, is returned to the position shown in Figs. 1 and 2, which closes the apertures, *a* and *a'*, above the reservoir, and opens *c f* and *c' f'* below it. The steam will now rush up through the neck, H, on the outside of the tube, *f*2, and through the passages *f*, *c*, *c*2, into the reservoir, instantly producing a pressure in the reservoir nearly equal to that in the cylinder. The oil will then run by gravity down through the aperture, *c f*, and the tube, *f*2, into the cylinder until the reservoir is empty, steam passing upward as before explained, to take the place of the oil. The apertures, *b'*, in valve B, shown at the top in Fig. 2, and *f'*, in the seat of valve, F, are elongated, so that when the catch. S on D, reaches notch *h*2, the steam will escape from the internal reservoir, through the tube, *a*2, and aperture *b*; moved forward till it rests in *h*3, the apertures, *a b*, are brought to correspond when the oil will descend. Reverse the lever till the catch rests in *h*; the aperture, *f*, being elongated, *f' c*2 are brought to correspond before *e f*, consequently the steam will rush up through the tube, *c*2, and fill the space above the oil before the oil is allowed to descend. Now move the lever backward till the catch rests in *h*, and the operation is complete. This will introduce the whole quantity of oil immediately into the cylinder. To render it self-feeding, we have but to introduce other notches like *m*, between *h h*, to admit the oil more slowly, or even drop by drop, as the exigency of the case may demand.

This invention was patented through the Scientific American Patent Agency, Dec. 2, 1862. For further information address the inventor, O. H. Dunham, Hydrostatic Press Room, U. S. Treasury, Washington, D. C.

Fig. 1

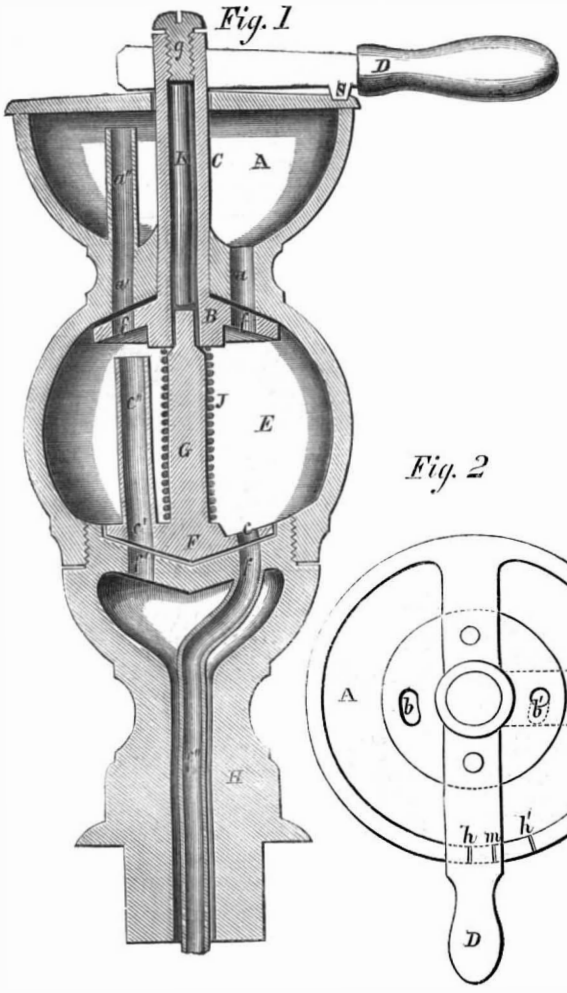
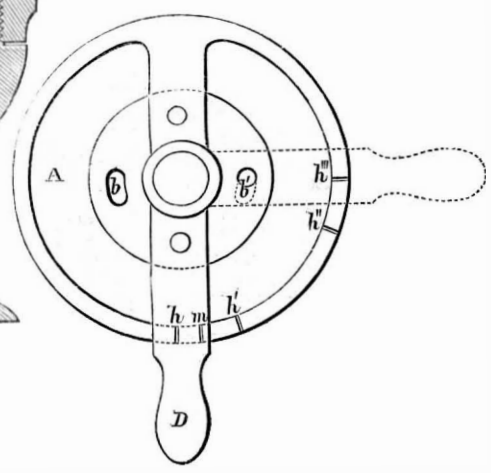


Fig. 2



DUNHAM'S PATENT LUBRICATOR.

How a crooked Keel affects a Ship.—The London *Mechanic's Magazine* says in a recent issue:—"I shall now refer to Captain Broadhead's report of the trial in the *Princess Royal*. In this vessel, from some cause or other, which we only found out after she was docked, a difficulty was experienced in making her complete the circle to starboard. It arose from the crookedness of the keel, which had been put on out of the straight, so that she carried, under ordinary circumstances, a strong port helm, and she could not be got round in one way for some time; but at the trial by Captain Coles, and by humoring her, the circle was completed to starboard; that being done, it satisfactorily proved that the rudder acted perfectly; but the fault in steering arose from a malformation of the vessel. This was the opinion of the Government officers."

Cheap Cheese.—Near Rome, N. Y., is a cheese factory which manufactures at a cost of one cent per pound. The care of it requires only four hands. The milk is brought from the farms every morning, and the cheese divided among the proprietors in proportion to the number of gallons of milk furnished.

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